Copyright

by

Marc Anthony Garcia

2015

The Dissertation Committee for Marc Anthony Garcia Certifies that this is the approved version of the following dissertation:

Nativity and Age of Migration in Relation to Morbidity, Disability and Active Life Expectancy among Older Mexican Americans

Committee:

Ronald J. Angel, Supervisor

Jacqueline L. Angel

Mark D. Hayward

Robert A. Hummer

Daniel A. Powers

Nestor Rodriguez

Nativity and Age of Migration in Relation to Morbidity, Disability and Active Life Expectancy among Older Mexican Americans

by

Marc Anthony Garcia, B.A.; M.S.

Dissertation

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

Doctor of Philosophy

The University of Texas at Austin

December 2015

Nativity and Age of Migration in Relation to Morbidity, Disability and Active Life Expectancy among Older Mexican Americans

Marc Anthony Garcia, Ph.D.

The University of Texas at Austin, 2015

Supervisor: Ronald J. Angel

The U.S. Mexican-origin population has experienced rapid growth over the past several decades, with aging Mexican Americans composing a significant part of this increase. Despite these growing numbers there has been relatively little research that explores how nativity and for immigrants, age of migration, affect health outcomes of Mexican Americans in later life. The objective of this dissertation is to examine and document differentials in morbidity, Activities of Daily Living (ADLs), Instrumental Activities of Daily Living (IADLs), and Performance-Oriented Mobility Assessment (POMA) limitations across eight groups by gender, nativity and age of migration among Mexican-origin elderly individuals residing in the southwestern United States. This broad examination takes into account the demographic heterogeneity of the U.S. Mexican-origin population and is especially timely given the rapid population aging that U.S. Latino and immigration subpopulations are experiencing. I argue that the life experiences of the foreign-born in the U.S. are likely to be shaped by the age and the period at which they immigrated to the United States. Results show that there are important differences by nativity and age of migration in the prevalence, ALE, and functional limitation

trajectories of foreign-born Mexican elders. Female migrants are at a significant disadvantage in terms of IADL disability relative to U.S.-born women, particularly early and late life migrants. Conversely, mid and late life male migrants exhibit a health advantage in TLE and ADL disability compared to their U.S.-born counterparts. Furthermore, results indicate that mid and late life migrant males have lower functional disability at age 65, however have a steeper increase in POMA limitation over time relative to U.S.-born and early life migrants. These findings illustrate foreign-born Mexican elders are not a homogeneous group. While the majority of individuals in this cohort report a disability, there are large variations by nativity and for immigrants by age at migration. This issue merits special attention in the development of community-based long-term care programs to appropriately target the specific needs of different sub-groups of older individuals of Mexican-origin who are entering into their last decades of life.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

MOTIVATION

A large body of research has identified what has been called the "healthy immigrant effect" in which foreign-born individuals residing in the United States tend to show favorable health, mortality, and life expectancy profiles relative to their U.S.-born counterparts (Bostean, 2013; Hayward, Warner and Crimmins 2007; Markides and Gerst 2011; Palloni and Arias 2004; Riosmena and Dennis 2012; Akresh and Frank, 2008; Singh and Hyatt, 2006). Among studies of Latino immigrants, this effect is best documented among Mexicans, who are among the poorest and least educated population groups in the United States (Riosmena and Dennis 2012; Palloni and Arias, 2004; Rubio and Saenz, 2007; Telles and Ortiz, 2007). Selective migration is thought to shape the health profiles of Mexican immigrants through two separate pathways: positive health selection (in-migration) and negative health selection (out-migration). First, individuals who migrate are not a random-cross section of their origin population, and tend to be healthier, on average, than non-migrants and their U.S.-born counterparts (Jasso 2004). Similarly, out-migration selectivity, also known as the "salmon bias effect," expects foreign-born Mexicans who have become ill or are in poor health to return to their country of origin, particularly at older ages (Markides and Eschbach, 2005; Palloni and Arias 2004; Turra and Elo 2008).

In addition, some evidence indicates that immigrant differentials in health and mortality arise because of differences in social and cultural characteristics and health

related behaviors (Antecol and Bedard, 2006; Fenelon 2013; Hummer and Hayward 2015; Markides and Gerst 2011). Indeed, immigrant health may be protected by social and cultural factors that influence health and lifestyle behaviors such as a traditional diet, family structure and social networks that originate either in the receiving or sending country, which may enable immigrants to better cope with stress and promote better health behaviors (Acevedo-Garcia and Bates 2008; Hummer et al. 2007; Jasso et al. 2004; Markides and Gerst 2011; Palloni and Arias 2004; Landale, Oropesa, and Gorman 2000). However, this initial advantage tends to dissipate over time as the health of Mexican immigrants deteriorates to the level of their native-born counterparts (Lariscy, Hummer, and Hayward 2013; Lopez-Gonzalez et al., 2005; Martinez et a. 2014; Markides and Gerst, 2011; Markides and Eschbach, 2005; Riosmena et al. 2014; Rumbaut, 1997).

Research suggests several reasons why immigrant health may deteriorate in the United States. First, a lack of insurance and inadequate access to health care, particularly for undocumented migrants, may lead to health deterioration (Angel and Angel 1996; Hummer and Hayward 2015; Markides and Eschback 2005; Teruya and Bazargan-Hejaz 2013). Having health insurance is a key predictor of access to health care, particularly for immigrants (Derose et al. 2009; Singh and Hiatt 2006). Barriers in access to health care and social services may contribute to poorer health and higher rates of morbidity and mortality among this segment of the population. Second, evidence suggests that foreign-born Latinos are more likely to engage in negative health behaviors (smoking, alcohol consumption, and unfavorable dietary changes) with longer length of residence and

greater acculturation in the United States (Antecol and Bedard, 2006; Akresh, 2007; Kimboro 2009; Lariscy et al., 2013; Turra and Goldman, 2007). Finally, Mexican immigrants may live and work under unhealthy conditions that expose them to infectious disease, environmental toxins, injury, and other health risks place them at disproportionate risk of physical difficulties and disabilities at older ages (Acevedo-Garcia 2001; Hummer and Hayward 2015; Kandel and Donato 2009; Orrenius and Zavodny 2009).

Following this interpretation, positive selection may contribute (along with protective cultural aspects) to a health advantage for U.S. Mexican immigrants. Although migration from Mexico to the U.S. is recognized as an important phenomenon, relatively little research has considered the degree of selection of healthy immigrants by age of migration on various aspects of health and well being within the Mexican-origin elderly population. Studies often assume that immigrants from Mexico are a homogeneous group in terms of attributes related to health status and health behaviors and thus, have an identical level of "health advantage" upon arrival to the U.S. However, Mexican immigrants are not a homogeneous group in terms of sociodemographic characteristics, as well as motivations and conditions of migration (i.e. gender, age of migration, historical period of migration, and duration in the U.S.), which may result in heterogeneity in the degree of health selection. For instance, there may be large gender differences between labor migrants and follower migrants. Furthermore, differences may also arise among immigrants who migrated at a similar stage in life, though in a different historical time period.

Despite the substantial increase in the Mexican immigrant population, few epidemiological studies examine the effects of migration to the U.S. and health among the Mexican elderly. By focusing on health disparities by nativity, the "healthy immigrant paradox" literature downplays morbidity, functional limitations, disability, and mortality differences *among* the foreign-born and complicates our understanding in the social and health status heterogeneity of older Mexican immigrants.

OBJECTIVES

The objective of this dissertation is to examine and clearly document and provide as much explanation as possible on how nativity and, among immigrants, age of migration are associated with morbidity, disability, functioning, and active life expectancy among Mexican-origin elderly individuals residing in the southwestern United States. I advance the literature on immigrant and health disparities in disability and functioning for older Mexican-origin adults through three empirical studies.

Chapter 2 examines nativity and, for immigrants, age of migration disparities in the prevalence of morbidity, disability and physical functioning in the United States, specific to age group. I distinguish among foreign-born and native-born Mexican elderly, and for the foreign-born, by age of migration. This chapter will build on prior related research in two key ways. First, I provide a more comprehensive documentation of nativity differentials than is typically the case by distinguishing eight groups by gender, nativity and age of migration among Mexican-origin elderly individuals residing in the southwestern United States. Second, I include three separate measures of functioning and disability: Activities of Daily Living (ADLs), Instrumental Activities of Daily Living (IADLs), and Performance-Oriented Mobility Assessment (POMA). Third, I use a life

course framework to better assess the heterogeneity among the foreign-born Mexican-origin elderly population and examine how age of migration differentiates health disparities in physical functioning and disability. The inclusion of age of migration is particularly important to gain a better understanding of why immigrant-native differences exist, given the rapid growth and aging of the Mexican-origin population in the United States. This broad documentation sets the stage for two in-depth examinations of active life expectancy and disability trajectory differences by nativity and age of migration.

These latter two chapters provide up-to-date documentation of nativity and age of migration differences in measures of functioning, and disability, and also assesses whether the ‘‘healthy immigrant’’ phenomenon varies among older foreign-born Mexican-origin subgroups in terms of the remaining years spent in a healthy/unhealthy state. Specifically, Chapter 3 investigates how foreign-born Mexican elderly subgroups compare to U.S.-born Mexican American elderly individuals in active life expectancy, using measures of Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) disability.

Chapter 4 examines nativity and age of migration differentials in disability trajectories among Mexican-origin elders, using Activities of Daily Living (ADLs) and Performance-Oriented Mobility Assessment (POMAs). All three chapters will employ data from the Hispanic Established Population for the Epidemiologic Study of the Elderly (H-EPESE) to document heterogeneity in morbidity and disability among older people of Mexican-origin.

BACKGROUND

Literature on Latino health is dominated by the concept of the epidemiological paradox. Specifically, researchers have found that Latinos in the U.S. fare comparably to whites on many measures of health, including several morbidity measures, and all-cause mortality despite their low socioeconomic status (Markides and Eschbach, 2005). Research shows that Latinos as a group enjoy surprisingly long life expectancy at birth and at 65 that are equal if not longer than those of non-Latino whites (Markides and Eschbach 2005; Palloni and Arias 2004). At age 65, Latino males have a remaining life expectancy of 19 years and Latino females 21.7 years compared to 17.1 for non-Latino white males and 19.7 for non-Latino white females (Arias, 2010). However, a substantial body of research has found Latinos to be disproportionately vulnerable to certain health conditions such as diabetes, hypertension, obesity, and infectious and parasitic diseases compared with non-Latino whites (Bastida and Pagan, 2002; Flegal et al. 2010; Markides and Gerst, 2011; Palloni 2007). Moreover, older Latinos suffer significantly higher rates of disability and functional limitations compared with non-Latino whites (Hummer, Benjamins, and Rogers, 2004; Haas, Krueger, and Rohlfsen, 2012; Markides, Escbach, Ray, and Peek, 2007).

Reaching definitive conclusions regarding relative health advantages and disadvantages of the U.S. Latino population has proven difficult, in part because comparisons are generally made to non-Latino whites. For example, according to Markides and Eschbach (2005), the epidemiological paradox is typically framed by drawing comparisons between Latinos and non-Latino whites. And yet nativity differences in Latino health are crucial since they shed light on whether the initial

immigrant advantages in health dissipate over time or successive generations (Antecol and Bedard, 2006; Markides and Eschbach, 2005; Rumbaut 1997). Research suggests that foreign-born Latinos are more likely to engage in negative health behaviors such as smoking, drinking, and unfavorable dietary changes with longer length of residence in the United States (Lariscy et al., 2013; Rodriguez, Saenz and Menjivar, 2008; Turra and Goldman, 2007). In addition, recent evidence suggests that the healthy immigrant effect evident in mortality rates for foreign-born Latinos is not mirrored in their disability rates (Hayward, Hummer, Chiu, Gonzalez and Wong, 2014; Cantu et al., 2013; Markides, Eschbach, Ray and Peek, 2007).

The foreign-born appear to spend more years of late life with a disability than their U.S. - born counterparts. For example, using 2000 Census data, Markides et al. (2007) found that both men and women of Latino-origin reported higher levels of disability at older ages than non-Latino whites, with Latino women of foreign-born status exhibiting especially high disability rates compared to non-Latino white women. Similarly, Hayward et al. (2014) found foreign-born Latinos in the U.S. exhibited the greatest burden of disability among all racial/ethnic groups, defined by number of years of life spent with an activity of daily living limitation. Conversely, Cantu and colleagues (2013) found that foreign-born Latinos have the longest estimated life expectancies at age 50 and have a lower prevalence of chronic conditions and functional limitations compared to non-Latino whites. In addition, this study also showed that U.S.-born Latinos do not share the same health advantages of their foreign-born counterparts. U.S.-born Latinos' life expectancy is comparable to that of non-Latino whites. However, they

spend more years with chronic conditions and functional limitations compared to foreign-born Latinos and non-Latinos whites.

Furthermore, a growing body of evidence suggests certain subgroups of Latinos suffer significantly higher rates of disability and functional limitations compared with non-Latino whites (Hayward et al. 2011). Recent research by Melvin et al. (2014) used 14 years of NHIS data and found that at ages 65 and older, foreign-born Mexican-origin men and women have significantly higher rates of ADL and IADL disability as well as functional limitations in comparison to non-Latino U.S.-born whites. In addition, Angel and colleagues (2014) found that foreign-born Mexican-origin elders live over half their lives after age 65 with a serious impairment, and there are important interactions by nativity such that foreign-born Mexican-origin women have the highest life expectancy and also the most years lived with a functional limitation. Importantly, they established that foreign-born Mexican-origin women spend 64% of their remaining years with serious limitations in physical functioning based on performance oriented mobility assessments, compared with 61% for native-born women, 52% for foreign-born men, and 53% for native-born men. More recent research by Garcia and colleagues (2015) showed that although foreign-born Mexican elderly individuals live longer relative to their native-born counterparts, they are doing so in a disabled state. This study found foreign-born women in particular spend a larger fraction of their elderly years with both ADL and IADL disability compared with native-born women. Furthermore, this study documents that foreign-born males also spend a significantly larger fraction of their elderly lives

with IADL disability compared with native-born men. However, they also spend a significantly larger fraction of non-disabled years ADL disability free.

Although the Mexican-origin population enjoys relatively long life expectancies relative to other racial and ethnic groups, this rapidly aging population is disproportionately beset by chronic diseases such as diabetes, obesity, hypertension and depression, as well as cognitive impairment (Bastida and Pagan, 2002; Flegal et al. 2010; Markides and Gerst, 2011; Gonzales et al., 2009; Zeki et al., 2012). This high rate of chronic illness suggests that a large fraction of the years past 65 may be characterized by serious functional impairment and frailty (Hummer and Hayward 2015; Al Snih et al. 2009). This is quite likely at least in part a result of decades of physically demanding occupations that has characterized a large concentration of the lives of Mexican immigrants who arrived as part of the Bracero Program between 1942 and 1964 (Hummer and Hayward 2015; Toussaint-Comeau, 2006; Donato 1999). For example, if a Mexican male arrived in the U.S. under the Bracero Program, it is safe to assume that he was exposed to pesticides and other agents that can have both short- and long-term health effects. Additionally, this type of work requires much physical assertion that later in life might relate to their physical abilities, self-care abilities, and work disabilities, just to name a few.

Migration selectivity has been the most common explanation for the observed differentials in health outcomes among the Mexican-origin population. Selective migration is defined as disproportionate migration by individuals in good health compared with those in poor health into the United States. Following this interpretation,

positive selection may contribute (along with protective cultural aspects) to a health advantage for U.S. Mexican immigrants, which has been observed in several studies (Bostean 2013; Riosmena, Wong and Palloni, 2013; Rubalcava et al. 2008; Palloni and Morenoff, 2001). Mexican immigrants who migrate to the United States are not thought to be a random cross-section of the origin population and are believed to be healthier than those who do not migrate, and may indeed also be healthier than the average individual in the receiving country (Bostean, 2013; Palloni and Arias, 2004).

Much of the available evidence on health disparities and mortality examines Mexican migrants as a whole, leading to potential issues of selection bias. However, Mexican immigrants are not a monolithic group and little is known about how age at migration predicts disability, functional limitation, and mortality among foreign-born Mexican elderly individuals. Indeed, age at migration is an important factor for understanding the health status of older immigrants (Hummer and Hayward 2015, Gubernskaya 2014; Angel, Angel and Markides 2003). Differences in motivation for immigration and selection mechanisms by gender might be found between younger and older immigrants and within the older immigrant population, depending on age of migration, since both the likelihood of emigrating from Mexico and that of returning to Mexico varies with age (Choi 2012; Massey 2001). In addition, health selectivity might not be applicable to late life immigrants, whose major motivation tends to be family reunification rather than occupational opportunities, particularly for women (Angel et al., 2001; Choi 2012; Akresh and Frank 2008; Jasso et al. 2004).

Clearly, there are serious policy implications of research on the timing of immigration in understanding the causal links between exposures and health outcomes within the foreign-born Mexican population. The degree of health selectivity may vary dramatically depending on age of migration because age differences speak to the importance of life course stage. Furthermore, selectivity is a complex process and its effects may vary for different health conditions and for men and women (Martinez 2014). Thus, comparing social and physical disability outcomes for the foreign-born and native-born can highlight the importance of positive selectivity advantages and disadvantages among Mexican elderly individuals. With the rapid aging of the Mexican-origin population in the United States, now is the time for a thorough study to assess whether nativity and age of migration differentials in morbidity, disability, physical functioning, and healthy/unhealthy life expectancy characterize elder Mexican men and women.

SIGNIFICANCE

My dissertation will build on previous related research in several important ways. First, most related studies focus on only a few Latino sub-groups when examining morbidity, disability, physical functioning, and active life expectancy; in contrast, the first analytic study of my dissertation examines morbidity, Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs), and Performance-Oriented Mobility Assessment (POMA) to assess chronic conditions and functional limitations across eight groups by gender, nativity and age of migration among Mexican-origin elderly individuals residing in the southwestern United States. This broad examination takes into account the demographic heterogeneity of the U.S. Mexican-origin population

and is especially timely given the rapid population aging that U.S. Latino and immigration subpopulations are experiencing. Second, in contrast to past research that relies almost exclusively on nativity to assess immigrant-native differences health and well-being among Latinos, I will use expanded immigrant categories to better assess the heterogeneity among foreign-born Mexican-origin elderly individuals. Third, I will examine how age of migration confounds nativity disparities in active life expectancy by better specifying foreign-born immigrant subgroups. These analyses move beyond the description of nativity differences by dividing immigrants into three life course stages of migration to help gain a better understanding of why such immigrant-native differences exist. This is particularly important given the rapid growth and aging of the Mexican-origin population in the United States.

OVERVIEW OF DATASET

My dissertation draws on data from the Hispanic Established Population for the Epidemiologic Study of the Elderly (H-EPESE). The H-EPESE is an on-going National Institute on Aging (NIA) funded longitudinal cohort study that provides basic information on sociodemographic, health and psychosocial characteristics, as well as health care needs of community-dwelling Hispanic elderly individuals, aged 65 years and older, residing in the five southwestern states of Arizona, California, Colorado, New Mexico, and Texas (Markides et al., 1997). The data set utilized a multistage area probability sampling design modeled after previous Established Populations for the Epidemiologic Study of the Elderly Studies conducted in New Haven, East Boston, rural Iowa, and North Carolina. Initially, counties in the Southwestern states were listed by the number of Hispanics in descending order needed to cover 90 % of all Hispanics. Counties

that were at least 30 % Hispanic were added to assure inclusion in the target population of small counties with a significant Hispanic population.

Census tract and enumeration districts in the above counties were subsequently listed by number of Hispanics. From this list of census tracts, 300 primary sampling units (PSUs) were selected, which provided clusters for door-to-door screening. Within each of these selected PSUs, all block groups were listed and a cumulative total of households were calculated. Blocks in each track were then selected as sampling units by a random process, and a total of 175 households within each sampling unit were screened. Eligible respondents were identified based on reported age, self-identification as Hispanic, reported birthplace (Mexico or the United States), and a review of ethnic background of a respondent's parents and grandparents. Interviews were conducted in Spanish or English with all members of the household who were Hispanic and aged 65 and over. The response rate at baseline (1993-1994) was 83 percent, which was comparable to the other EPESE studies.

Bilingual interviewers (Spanish and English) conducted all interviews. They were trained by the project staff and by employees of Harris Interactive Inc. Interviews were conducted in the home of the respondent or their proxy. The baseline and first follow-up interview lasted approximately 90 minutes, with the subsequent interviews each lasting approximately 60 minutes. Each interviewer gathered information on sociodemographics, health conditions, and psychosocial characteristics of the respondents or their proxy. In addition, anthropometric measures, blood pressure measures, and physical function measures of upper and lower body of the subjects were obtained.

The H-EPESE has been used extensively to study the prevalence of disability among Mexican-origin adults in the U.S (Peek et al. 2003; Peek, Patel and Ottenbacher 2005). These data provide detailed information on risk factors for physical illness and

mortality for a sample of 3,050 individuals of Mexican-origin who were first interviewed in 1993-1994. This panel was re-contacted in 1995-96, 1998-99, 2000-01, 2004-05, 2007, and 2010-11. Because of attrition in the original cohort, a new cohort of 902 individuals who were the same age as the original cohort (75 or older at the time) was added in 2004 to increase sample size and statistical power. This new panel was re-contacted in 2007 and 2010-11.

Chapter 2: Age of Migration, Morbidity and Disability among the Elder Mexican-Origin Population

INTRODUCTION

The Latino population within the United States has experienced unprecedented growth in the past several decades, surpassing African Americans as the nation's largest minority group. Between 2000 and 2010, the Latino population increased by 43 percent, from 35.3 million to 50.5 million (U.S. Census Bureau, 2011). In 2015, there were approximately 57.1 million Latinos residing in the United States; this number is projected to increase dramatically to over 128.8 million by 2060 (U.S. Census Bureau, 2015). While the Latino population is generally young, Latinos 65 and older represent the fastest-growing segment of the population of the United States currently at or near retirement. In 2012, 3.1 million or 5.8 percent of those over 65 were Latinos, and their number is projected to increase to over 15.4 million by 2050 (U.S. Census Bureau, 2014). Mexicans Americans are by far the largest Latino-origin subgroup in the U.S., accounting for nearly two-thirds of the total Latino population. A record 33.7 million Latinos of Mexican-origin, including 11.4 million immigrants born in Mexico, resided in the United States in 2012 (Gonzalez-Barrera and Lopez, 2013).

These demographic trends strongly suggest that the health status of Latinos, both foreign and native-born, will play an increasingly central role in shaping and understanding health outcomes and policy in the U.S. The substantial growth of the Mexican-origin population has been accompanied by a need to improve and protect their health (Escarce et al., 2006). With rapid growth and aging in the Latino population, more research on older Latinos is critical to understand current health and longevity patterns

among Latinos and consider how such patterns may change given the social, behavioral, and policy contexts of the United States (Hummer and Hayward, 2015). These trends and projections underscore the need for additional focus on the health of both foreign-born and U.S-born elderly Latinos, particularly those of Mexican-descent. In particular, it will be important to better understand how nativity and the migration patterns of aging Latinos influence the morbidity, disability, physical functioning, and mortality patterns of this growing population.

While there has been growing interest in overall Latino health by policy makers and researchers, most health-related studies have focused primarily on immigrants at younger ages or on mortality rates more broadly by nativity, and do not make distinctions among the foreign-born, thus downplaying potential health differentials that may emerge in later life (Gonzales et al., 2009; Markides et al., 2007). For instance, despite their growing numbers, there is a significant lack of information regarding the strengths and characteristics of aging Latino groups in general, and for Mexican-origin individuals in particular. Relatively little research has examined the extent to which immigration variables impact morbidity, functional limitations, disability, and mortality outcomes among Mexican-origin elderly individuals residing in the U.S. The Mexican-origin elderly population is heterogeneous in its nativity composition and their health in later life varies considerably depending on their place of birth, age of migration, gender, social and cultural environment, health behaviors, social networks and socioeconomic status.

BACKGROUND

A substantial body of research affirms that nativity status has a strong relationship with health (Hummer and Hayward, 2015; Lariscy, Hummer, and Hayward, 2015; Angel, Angel, and Hill, 2014; Melvin et al., 2014; Markides and Gerst, 2011; Huh et al., 2008).

Immigrants from Mexico tend to migrate to the United States for economic and/or employment opportunities. They are more likely to come from lower socioeconomic and educational backgrounds and generally have weaker SES-health gradients than their U.S.-born counterparts (Kimbro et al., 2008; Turra and Goldman, 2007). Their number, coupled with the poorer economic conditions in Mexico, has generated much debate among researchers and policy makers because immigrant health has important consequences for the large and growing elderly Latino population and by extension, the U.S. elderly population in general (Hummer and Hayward, 2015).

For instance, the U.S. has more immigrants from Mexico alone than any other country has immigrants (Pew Research Center, 2013). Among the foreign-born, Mexican immigrants comprise the single largest group and account for one-third of all U.S. immigrants who arrived between 1990 and 2000 (Saenz, 2004). Therefore, nativity is a relevant correlate to consider when assessing the heterogeneity in the health and mortality experiences of Latinos and specifically the Mexican-origin elderly. Indeed, research points to nativity as an important factor for determining individual health status in part because the foreign-born generally have less access to formal and informal support systems that include healthcare, support of family and friends, and socioeconomic resources (Angel et al., 2001). Furthermore, the "healthy immigrant" hypothesis posits that U.S. immigrants are generally healthier than both their native-born counterparts and those from their sending countries across a range of outcomes, including, health behaviors (Kimbro, 2009; Lopez-Gonzalez et al., 2005), body mass (Antecol and Bedard, 2006; Hao and Kim, 2009) , allostatic load (Kaestner et al., 2009; Peek et al., 2010), chronic conditions (Choi, 2012; Jasso et al., 2004), disability (Markides and Gerst, 2011),

and mortality risk (Lariscy, Hummer, and Hayward, 2015; Angel et al., 2010). However, these advantages tend to erode over time as immigrants incorporate into mainstream U.S. society. While their SES tends to improve with length of residence in the host country, the association between immigrant health and duration of time spent in the U.S. is often negative (Lara et al., 2005; Myers et al., 2006)

Previous research has shown native-born Mexican elderly have a health profile more indicative of their minority and lower socioeconomic status while foreign-born Mexican elderly have much more favorable mortality and health profiles (Cantu et al., 2013). Mexican immigrants appear healthy when they arrive in the United States, but over time, through the process of incorporation into U.S. society, their health deteriorates to the level of their native-born counterparts (Markides and Eschbach, 2005). The diminishing immigrant health advantage may conceal an important fact that, although some foreign-born individuals are able to preserve good health, others experience faster than average health declines. The connection between immigration and health is complex, and a host of factors related to immigration processes, in terms of the initial migration from Mexico (health selection) and subsequent incorporation into the United States, produce a variety of health outcomes (Palloni and Morenoff, 2001).

Indeed, immigration processes may play a protective role, although the overall impact of immigration on the health and disability trajectory (negative or positive) of older Mexican-origin individuals is often difficult to gauge (Jasso et al., 2004). Although migration from Mexico to the U.S. is recognized as an important social, political and economical phenomenon, relatively little research has examined the effects of migration on various aspects of health and well being within the Mexican-origin elderly population. By focusing on health disparities by nativity, the "healthy immigrant paradox" literature downplays morbidity, functional limitations, disability, and mortality differences *among*

the foreign-born. At the same time, one of the most unique features of the foreign-born Mexican-origin population is their range of immigration experiences (i.e. by gender, age of migration, duration in the U.S.); disregarding these important factors results in an incomplete understanding of health patterns among older Mexican immigrants.

While it is reasonable to expect that socioeconomic gradients in overall health among immigrants may partially reflect the health profile in the countries of origin, immigrant gradients may be modified by the migration process in several other ways (Riosmena et al., 2012). For example, migration is a selective endeavor on many dimensions (Angel et al., 2014; Bostean, 2013; Chiquiar and Hanson, 2005; Gubernasky et al., 2015; Riosmena et al., 2014). As such, migrants may be positively selected in terms of health relative to those who did not migrate in their sending countries. Studies have found evidence consistent with at least a modest degree of immigrant selection in health among Latinos (Akresh and Frank, 2008 ; Bostean, 2013; Crimmins et al., 2005; Patel et al., 2006; Riosmena et al., 2010; Rubalcava et al., 2008). These studies recognize the importance of timing of migration in understanding causal links between exposures and health outcomes within the life course. Indeed, age of migration has long been recognized as an important factor that influences the processes of immigration and incorporation, because it identifies the stage of the life course at which an immigrant is beginning life in a new country.

The goal of this chapter is to document nativity and, for immigrants, age of migration disparities in the prevalence of morbidity, disability and physical functioning in the United States, specific to age group. I distinguish among foreign-born and native-born Mexican elderly, and for the foreign-born, by age of migration. This chapter will build on prior related research in two key ways. First, I provide a more comprehensive documentation of nativity differentials than is typically the case by distinguishing eight

groups by gender, nativity and age of migration among Mexican-origin elderly individuals residing in the southwestern United States. Second, I include three separate measures of functioning and disability: Activities of Daily Living (ADLs), Instrumental Activities of Daily Living (IADLs), and Performance-Oriented Mobility Assessments (POMA). Third, I use a life course framework to better assess the heterogeneity among the foreign-born Mexican-origin elderly population and examine how age of migration differentiates health disparities in physical functioning and disability. The inclusion of age of migration is particularly important to gain a better understanding of why immigrant-native differences exist, given the rapid growth and aging of the Mexican-origin population in the United States.

To assess nativity differences in the prevalence of morbidity and disability for elderly Mexican Americans, by gender and age, this chapter employs data (1993-2011) from the Hispanic Established Population for the Epidemiological Study of the Elderly (HEPESE) to address the following question: to what extent does morbidity and disability prevalence differ by nativity and among the foreign-born by age of migration for Mexican American elders residing in the United States?

LITERATURE REVIEW

Literature on Latino health is dominated by the concept of the epidemiological paradox. Specifically, researchers have found that Latinos in the U.S. fare comparably to whites on many measures of health, including several morbidity measures, and all-cause mortality despite their low socioeconomic status (Markides and Eschbach, 2005). Research shows that Latinos as a group enjoy surprisingly long life expectancy at birth and at 65 that are equal if not longer than those of non-Latino whites (Markides and Eschbach, 2005; Palloni and Arias, 2004). At age 65, Latino males have a remaining life

expectancy of 19 years and Latino females 21.7 years compared to 17.1 for non-Latino white males and 19.7 for non-Latino white females (Arias, 2010). However, a substantial body of research has found Latinos to be disproportionately vulnerable to certain health conditions such as diabetes, hypertension, obesity, and infectious and parasitic diseases compared with non-Latino whites (Bastida and Pagan, 2002; Flegal et al., 2010; Markides and Gerst, 2011; Palloni, 2007). Moreover, older Latinos suffer significantly higher rates of disability and functional limitations compared with non-Latino whites (Hummer, Benjamins, and Rogers, 2004; Haas, Krueger, and Rohlfsen, 2012; Markides, Escbach, Ray, and Peek, 2007).

Reaching definitive conclusions regarding relative health advantages and disadvantages of the U.S. Latino population has proven difficult, in part because comparisons are generally made to non-Latino whites. For example, according to Markides and Eschbach (2005), the epidemiological paradox is typically framed by drawing comparisons between Latinos and non-Latino whites. And yet nativity differences in Latino health are crucial since they shed light on whether the initial immigrant advantages in health dissipate over time or successive generations (Antecol and Bedard, 2006; Markides and Eschbach, 2005; Rumbaut, 1997). Research suggests that foreign-born Latinos are more likely to engage in negative health behaviors such as smoking, drinking, and unfavorable dietary changes with longer length of residence in the United States (Lariscy et al., 2013; Rodriguez, Saenz and Menjivar, 2008; Turra and Goldman, 2007). In addition, recent evidence suggests that the healthy immigrant effect evident in mortality rates for foreign-born Latinos is not mirrored in their disability rates (Hayward, Hummer, Chiu, Gonzalez and Wong, 2014; Cantu et al., 2013; Markides, Eschbach, Ray and Peek, 2007).

The foreign-born appear to spend more years of late life with a disability than their U.S. - born counterparts. For example, using 2000 Census data, Markides et al., (2007) found that both men and women of Latino-origin reported higher levels of disability at older ages than non-Latino whites, with Latino women of foreign-born status exhibiting especially high disability rates compared to non-Latino white women. Similarly, Hayward et al., (2014) found foreign-born Latinos in the U.S. exhibited the greatest burden of disability among all racial/ethnic groups, defined by number of years of life spent with an activity of daily living limitation. Conversely, Cantu and colleagues (2013) found that foreign-born Latinos have the longest estimated life expectancies at age 50 and have a lower prevalence of chronic conditions and functional limitations compared to non-Latino whites. In addition, this study also showed that U.S.-born Latinos do not share the same health advantages of their foreign-born counterparts. U.S.-born Latinos' life expectancy is comparable to that of non-Latino whites. However, they spend more years with chronic conditions and functional limitations compared to foreign-born Latinos and non-Latinos whites.

Furthermore, a growing body of evidence suggests certain subgroups of Latinos suffer significantly higher rates of disability and functional limitations compared with non-Latino whites (Hayward et al., 2011). Recent research by Melvin et al. (2014) used 14 years of NHIS data and found that at ages 65 and older, foreign-born Mexican-origin men and women have significantly higher rates of ADL and IADL disability as well as functional limitations in comparison to non-Latino U.S.-born whites. In addition, Angel and colleagues (2014) found that foreign-born Mexican-origin elders live over half their lives after age 65 with a serious impairment, and there are important interactions by nativity such that foreign-born Mexican-origin women have the highest life expectancy and also the most years lived with a functional limitation. Importantly, they established

that foreign-born Mexican-origin women spend 64% of their remaining years with serious limitations in physical functioning based on performance oriented mobility assessments, compared with 61% for native-born women, 52% for foreign-born men, and 53% for native-born men. More recent research by Garcia and colleagues (2015) showed that although foreign-born Mexican elderly individuals live longer relative to their native-born counterparts, they are doing so in a disabled state. This study found foreign-born women in particular spend a larger fraction of their elderly years with both ADL and IADL disability compared with native-born women. Furthermore, this study documents that foreign-born males also spend a significantly larger fraction of their elderly lives with IADL disability compared with native-born men. However, they also spend a significantly larger fraction of non-disabled years ADL disability free.

Although the Mexican-origin population enjoys relatively long life expectancies relative to other racial and ethnic groups, this rapidly aging population is disproportionately beset by chronic diseases such as diabetes, obesity, hypertension and depression, as well as cognitive impairment (Bastida and Pagan, 2002; Flegal et al., 2010; Markides and Gerst, 2011; Gonzales et al., 2009; Zeki et al., 2012). This high rate of chronic illness suggests that a large fraction of the years past 65 may be characterized by serious functional impairment and frailty (Hummer and Hayward, 2015; Al Snih et al., 2009). Quite likely, this is at least in part a result of decades of physically demanding occupations that have characterized a large concentration of the lives of Mexican immigrants who arrived as part of the Bracero Program between 1942 and 1964 (Hummer and Hayward 2015; Toussaint-Comeau, 2006; Donato 1999). For example, if a Mexican male arrived in the U.S. under the Bracero Program, it is safe to assume that he was exposed to pesticides and other agents that can have both short- and long-term health

effects. Additionally, this type of work requires repetitive and taxing physical labor that contributes to limited physical and self-care abilities, and work disabilities later in life. Migration selectivity has been the most common explanation for the observed differentials in health outcomes among the Mexican-origin population. Selective migration is defined as disproportionate migration by individuals in good health compared with those in poor health into the United States. Following this interpretation, positive selection may contribute (along with protective cultural aspects) to a health advantage for U.S. Mexican immigrants, a phenomenon which has been observed in several studies (Bostean, 2013; Riosmena, Wong and Palloni, 2013; Rubalcava et al., 2008; Palloni and Morenoff, 2001). Mexican immigrants who migrate to the United States are not thought to be a random cross-section of the origin population and are believed to be healthier than those who do not migrate, and may indeed also be healthier than the average individual in the receiving country (Bostean, 2013; Palloni and Arias, 2004).

Much of the available evidence on health disparities and mortality examines Mexican migrants as a whole, leading to potential issues of selection bias. However, Mexican immigrants are not a monolithic group and little is known about how age at migration predicts disability, functional limitation, and mortality among foreign-born Mexican elderly individuals. Indeed, age of migration is an important factor for understanding the health status of older immigrants (Hummer and Hayward, 2015, Gubernskaya, 2014; Angel, Angel and Markides, 2003). Differences in motivation for immigration and selection mechanisms might be found between younger and older immigrants and within the older immigrant population, depending on age of migration, since both the likelihood of emigrating from Mexico and that of returning to Mexico varies with age (Choi, 2012; Massey, 2001). In addition, health selectivity might not be

applicable to late life immigrants, whose major motivation tends to be family reunification rather than occupational opportunities (Angel et al., 2001; Choi, 2012; Akresh and Frank, 2008; Jasso et al., 2004).

Clearly, there are serious policy implications of research on the timing of immigration in understanding the causal links between exposures and health outcomes within the foreign-born Mexican population. The degree of health selectivity may vary dramatically depending on age of migration because age differences speak to the importance of life course stage. Furthermore, selectivity is a complex process and its effects may vary for different health conditions and for men and women (Martinez, 2014). Thus, comparing social and physical disability outcomes for the foreign-born and native-born can highlight the importance of positive selectivity advantages and disadvantages among Mexican elderly individuals. With the rapid aging of the Mexican-origin population in the United States, now is the time for a thorough study to assess whether nativity and age of migration differentials in morbidity, disability, and physical functioning characterize elder Mexican men and women.

Conceptual Framework

I utilize a life course perspective in order to test the "healthy immigrant effect," specific to age of migration, among foreign-born Mexican elderly individuals. This framework aims to link migration, health, and aging. Migration cannot be conceived of as a single event; rather it is a phenomenon (process?) that impacts individuals throughout the life course (Angel and Angel, 1992). Motivations for migration vary for different age groups, as well as one's age of migration (Angel, Angel, Lee and Markides, 1999). A life course perspective argues that people's distal experiences in the area of socialization and stages in the life cycle impact health outcomes in the later stages of life (Dannefer 2003; Elder, Johnson, and Crosnoe 2003; Coward et al. 1997; Hays and George 2002). The life

experiences of the Mexican elderly are likely shaped by where they are born and, for the foreign-born, the age at which they immigrated to the U.S. Using this conceptual framework, I seek to examine how the Mexican migration experience to the United States changes the life course of individuals, the health process, and the quality of life in old age.

The Healthy Immigrant Effect

A large body of research has identified what has been called the "healthy immigrant effect" in which foreign-born individuals residing in the United States tend to show favorable health, mortality, and life expectancy profiles relative to their native-born counterparts (Bostean, 2013; Hayward, Warner and Crimmins 2007; Markides and Gerst, 2011; Palloni and Arias, 2004; Riosmena and Dennis, 2012; Akresh and Frank, 2008; Singh and Hyatt, 2006). Among studies of Latino immigrants, this effect is best documented among Mexicans, who are among the poorest and least educated population groups in the United States (Riosmena and Dennis, 2012; Palloni and Arias, 2004; Rubio and Saenz, 2007; Telles and Ortiz, 2007). Selective migration is thought to shape the health profiles of Mexican immigrants through two separate pathways: positive health selection (in-migration) and negative health selection (out-migration). First, individuals who migrate are not a random-cross section of their origin population, and tend to be healthier, on average, than non-migrants and their native-born counterparts (Jasso 2004). Similarly, out-migration selectivity, also known as the "salmon bias effect," expects foreign-born Mexicans who have become ill or are in poor health to return to their country of origin, particularly at older ages (Markides and Eschbach, 2005; Palloni and Arias 2004; Turra and Elo 2008).

In addition, some evidence indicates that immigrant differentials in health and mortality arise because of differences in social and cultural characteristics and health

related behaviors (Antecol and Bedard, 2006; Fenelon, 2013; Hummer and Hayward, 2015; Markides and Gerst, 2011). Indeed, immigrant health may be protected by social and cultural factors that influence health and lifestyle behaviors such as a traditional diet, family structure and social networks that originate either in the receiving or sending country, which may enable immigrants to better cope with stress and promote better health behaviors (Acevedo-Garcia and Bates, 2008; Hummer et al., 2007; Jasso et al., 2004; Markides and Gerst, 2011; Palloni and Arias, 2004; Landale, Oropesa, and Gorman, 2000). However, this initial advantage tends to dissipate over time as the health of Mexican immigrants deteriorates to the level of their native-born counterparts (Lariscy, Hummer, and Hayward, 2013; Lopez-Gonzalez et al., 2005; Martinez et al., 2014; Markides and Gerst, 2011; Markides and Eschbach, 2005; Riosmena et al., 2014; Rumbaut, 1997).

Research suggests several reasons why immigrant health may deteriorate in the United States. First, a lack of insurance and inadequate access to health care, particularly for undocumented migrants, may lead to health deterioration (Angel and Angel, 1996; Hummer and Hayward, 2015; Markides and Eschbach, 2005; Teruya and Bazargan-Hejaz, 2013). Health insurance coverage is a key predictor of access to health care, particularly for immigrants (Derose et al., 2009; Singh and Hiatt, 2006). Barriers in access to health care and social services may contribute to poorer health and higher rates of morbidity and mortality among this segment of the population. Second, evidence suggests that foreign-born Latinos are more likely to engage in negative health behaviors (smoking, alcohol consumption, and unfavorable dietary changes) with longer length of residence and greater acculturation in the United States (Antecol and Bedard, 2006; Akresh, 2007; Kimboro 2009; Lariscy et al., 2013; Turra and Goldman, 2007). Finally, Mexican immigrants may live and work under unhealthy conditions that expose them to

infectious diseases, environmental toxins, physical injuries, and other health related conditions that place them at disproportionate risk of physical difficulties and disabilities at older ages (Acevedo- Garcia, 2001; Hummer and Hayward, 2015; Kandel and Donato, 2009; Orrenius and Zavodny, 2009).

Following this interpretation, positive selection may contribute (along with protective cultural aspects) to a health advantage for U.S. Mexican immigrants. Although migration from Mexico to the U.S. is recognized as an important phenomenon, relatively little research has considered the degree of selection of healthy immigrants by age of migration on various aspects of health and well being within the Mexican-origin elderly population. Studies often assume that immigrants from Mexico are a homogeneous group in terms of attributes related to health status and health behaviors and thus, have an identical level of "health advantage" upon arrival to the U.S. However, Mexican immigrants are not a homogeneous group in terms of sociodemographic characteristics, or motivations and conditions of migration (i.e. gender, age of migration, duration in the U.S.), which may result in considerable heterogeneity in the degree of health selection. Despite the substantial increase in the Mexican immigrant population, few epidemiological studies examine the effects of migration to the U.S. and health among the Mexican elderly. By focusing on health disparities by nativity, the "healthy immigrant paradox" literature downplays morbidity, functional limitations, disability, and mortality differences *among* the foreign-born and complicates our understanding of heterogeneity in both the social and health status of older Mexican immigrants.

Age of Migration

One of the major distinguishing features of the Mexican-origin elderly population is its diversity on the basis of nativity and temporal presence in the United States. While

many Mexican-origin elders were born in the United States and others came during the early parts of the 20th century when they were young, many others immigrated as adults, including those who entered the country during their elder years. According to Gubernskaya (2014), age of migration can be useful for understanding health disparities in midlife and older age by approximating type of migration (i.e., labor versus family) and the degree of selectivity among immigrants. Thus, age of migration captures how opportunities for socioeconomic incorporation decline with age, which has implications for immigrants' ability to maintain good health after migration. Furthermore, besides approximating the length of exposure to U.S. society, it indicates the length of exposure to conditions in countries of origin, which may also affect the dynamics of health change throughout the life course (Gubernskaya, 2014).

From a life course perspective, I argue that the life experiences of the foreign-born in the U.S. are likely to be shaped by the age at which they immigrated to the United States. Health selection quite likely operates differently for different age groups. For example, migration selectivity may be strongest in young and middle ages (20-49), when Mexican immigrants migrate to the U.S. to pursue employment opportunities in agriculture, construction, and the service sector in which jobs can be physically demanding (Angel et al., 2010; Gubernskaya et al., 2013; Jasso et al., 2004). Labor migrants are by definition healthy enough to migrate, work when they arrive, and are thus self-selected on the basis of good health and the desire to improve their situations (Angel et al., 2010).

In contrast, Mexicans who migrated in early life as children or adolescents (1-19) are more likely to have been brought by their parents or relatives and have little or no selection since their migration reflects their parents' characteristics and they do not necessarily have to meet the demands required for migration by themselves (Angel et al.,

2010; Breslau et al., 2009; Colon-Lopez et al., 2008; Gubernskaya, 2014). In addition, these immigrants are more likely to have an experience that resembles those of their native-born counterparts, given that most of their development will occur in the U.S. (Meyers et al., 2009; Rumbaut, 2004; Treas, 2014). With increased duration of residence, foreign-born individuals increase their opportunities to incorporate into U.S. society (Angel, Buckley, and Sakamoto, 2001; Treas, 2014). For instance, those migrating in early life may have greater opportunities for incorporation in mainstream social institutions through education attainment and labor force participation (Bleakley, 2010; Gubernskaya et al., 2013). Thus, early life migration may be associated with a greater opportunity to accumulate higher levels of income, pension and other retirement benefits as a consequence of longer duration in the U.S. (Angel et al., 1999; Colon-Lopez et al., 2008; Meyers et al., 2009). Unfortunately, for those who migrate at younger ages, downward convergence toward native-born health has been found in relation to increased duration of residence in the United States (Angel et al., 2010; Choi, 2012; Wakabayashi, 2009).

Similarly, health selectivity may be weaker among those who migrate in late life because older Mexican migrants are more likely to migrate for family reunification reasons rather than employment opportunities (Angel et al., 2010; Jasso et al., 2004; Terrazas, 2009; Treas, 2014). In addition, those migrating in late life have fewer opportunities for social and economic incorporation and tend to experience greater difficulty with accumulating socioeconomic resources that would benefit health later in life (Angel et al., 1999; Borjas, 2011; Myers et al., 2009; Treas, 2014; Treas and Mazumdar, 2002; Wakabayashi, 2009). Furthermore, late life immigrants are less likely to qualify for Social Security or Medicare and more likely to be dependent upon family than their native-born counterparts or those immigrating earlier in life (Angel et al., 1999;

Borjas, 2011; O'Neil and Tienda, 2015), which leads to questions about how these individuals will be able to finance their old-age (Angel and Angel, 2006). However, migrants who come to the United States in late life are likely to retain social and cultural factors that influence health and lifestyle behaviors, and are unlikely to acculturate rapidly into U.S. society (Kimboro, 2009). Moreover, exposure to environmental factors, health risks, and poorer access to health care in their country of origin may also play a significant role in the health of elderly migrants (Akresh, 2007; Gubernskaya, 2014).

Age differences speak to the importance of life course stage. In early life, immigration may primarily be the product of parental characteristics, in midlife of individual characteristics, and in late life more likely to be affected by diminishing individual resources. Furthermore, younger immigrants may be more impacted by incorporation processes than older immigrants. This dissertation chapter adds to the small, but growing, literature that seeks to understand the health of the Latino elderly population, with a focus on Mexican elders. Specifically, I examine nativity and age of immigration as useful axes of differentiation to obtain a more accurate portrait of Mexican elderly health. This research addresses a gap in our understanding of the long-term consequences of nativity and age of immigration for the health of the elderly Mexican population.

DATA AND METHODS

Data

This research employs data from the Hispanic Established Population for the Epidemiologic Study of the Elderly (H-EPESE) to document nativity and age of migration differences in morbidity and disability among older people of Mexican-origin. The H-EPESE is a large, multi-stage probability sample of older Mexican-Americans

who reside in five southwestern states: Arizona, California, Colorado, New Mexico, and Texas (Markides et al., 1997). Aggregated individual level data from 1993-2011 is used to obtain prevalence estimates across survey years. Thus, the present study used baseline data (1993/1994, *n* = 3,050) and data obtained from 2-year (1995/ 1996, *n* = 2,438), 5-year (1998/1999, *n* = 1,980), 7-year (2000/2001, *n* = 1,682), 11-year (2004/2005, *n* = 2,069), 13-year (2006/2007, *n* = 1,542), and 17-year (2010/2011, *n* = 1,078) follow-up assessments. Due to attrition in the original cohort, a new cohort of 902 individuals was added in 2004 to increase sample size and statistical power. Note that I have omitted proxy respondents (*n* =563) from the analytic sample due to missing or invalid responses on the dependent variable. The final analytic sample includes 3,389 unique individuals and 11,525 cases.

Measures

The assessment of morbidities is based on six self-reported items that asked whether the respondent had ever been diagnosed by a doctor or medical personnel with one of the following six medical conditions: (a) a heart attack, or coronary, or myocardial infraction, or coronary thrombosis; (b) a stroke, a blood clot in the brain, or a brain hemorrhage; (c) cancer, or a malignant tumor of any type; (d) high blood pressure; (e) arthritis or rheumatism; or (f) diabetes, sugar in your urine, or high blood sugar. The original response categories for each item were: yes, no, or suspect/possible. Response categories for each items were coded 1 for "yes" and "suspect/possible" and 0 for "no." Previous research (Katz et al., 1996; Simpson et al., 2004; Skinner et al., 2005) has shown self-reported medical conditions by older adults to be reliable in comparison with medical records and physician reports. These six medical conditions are used because each one has potential to influence physical functioning and disability (Markides et al., 1996; Patel, Peek, Wong & Markides, 2006).

Disability refers to an elderly person's difficultly or inability to perform social roles and self-care tasks which are crucial for independent living (Spector & Fleisman, 1998, Crimmins, 2004). Disability is measured through two separate indicators: Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs). Both ADL and IADL measurements are commonly used in aging research and are well-documented as reliable scales to assess disability (Smith et al., 1990). To assess ADLs, respondents were asked if they could independently perform the following tasks: walk across a small room, bathe or shower, perform personal grooming (brush hair/teeth), dress, eat, get into or out of a bed, and use a toilet (Katz, Ford, Moskowitz, Jackson, and Jaffe, 1963; Branch, Katz, and Papsidero, 1984). ADL disability was dichotomized as "no help needed" versus "unable to", or "need help to do one or more of the tasks". A positive response was coded as an ADL limitation.

Instrumental activities of daily living (Rosow and Breslau, 1966; Lawton and Brody, 1969; Fillenbaum et al., 1988) are self-reported measures commonly used in studies of the elderly to identify individuals who have difficulty performing important activities of living and as such may be at risk for loss of independence in a community setting. Ten IADL activities were measured: use a telephone without assistance drive a car/use public transportation, go shopping, prepare own meals, do light housework, take medicine, handle finances, do heavy housework, walk up and down the stairs without help, and walk a half mile without help. Respondents were asked to indicate if he or she were unable to perform the activity without help. IADL disability was dichotomized as "no help needed" versus "unable to perform" or "need help with one or more of the tasks". A positive response was coded as an IADL limitation.

In addition, I use the performance-oriented mobility assessment (POMA) to assess functional mobility. The POMA is based on three tasks: standing balance (semi-

tandem and side by side), a timed 8-ft walk at a normal pace (gait speed), and a timed test of five repetitions of rising from a chair and sitting down (Guralnik, Ferrucci, Simonsick, Salive, & Wallace, 1995). Each assessment was coded (0) unable to complete task, (1) poor, (2) moderate, (3) good, and (4) best. Respondents who received a score of (0) on at least one POMA's item are coded as having a POMA disability.

Sociodemographic variables used in the analysis include nativity, age of migration, gender, age, and years of education. Nativity was assessed by asking the respondents if they were born in the United States. I use two measures of immigration status. To classify nativity, I use birth place information and categorize those respondents born in the U.S. versus those born in Mexico. To measure life course stage at migration, I include three age of immigration groups: those who arrived in childhood (1 – 19 years); middle age (20-49 years); and those who arrive in later life (after age 50). Gender corresponds to whether the respondent identifies as female or male. To assess how morbidity and disability patterns vary by age structures across four nativity and age of migration groups, three age categories are included: 65-74, 75-84 and 85 years and older. Finally, educational level is measured by the number of years of schooling the respondent has completed.

Analytic Approach

In the descriptive analysis I draw comparisons across morbidity and disability status using chi-square and *z*-tests for independent proportions to assess nativity, and for immigrants, age of migration differentials by gender and age. Prevalence is estimated for all morbidity and disability conditions by dividing the total number of cases of a condition (i.e. ADL/IADL) by the total population and multiplying this proportion by 100. For the multivariate models random effects Poisson regression with normally

distributed individual level random effects is used to account for repeated measurements on the same individual for up to 7 waves of data, and estimate risk ratios to quantify the association between nativity, age of migration, functional limitation, disability, and morbidity by gender and age. Models are specified with robust standard errors, resulting in a modified Poisson regression, which has been shown to be a valid method to estimate relative risk in binary response data (see, Zou, 2004). Moreover, the standard errors are adjusted since individuals can contribute more than one observation to the data set during the period under study. That is, the individual measures are clustered by subject and this specification takes that aspect of the data structure into account in a general way to produce the appropriate standard errors for a design such as this. The models are further stratified by gender because of the widely varying patterns of disability by sex.

RESULTS

Descriptive Statistics

Table 2.1 reports descriptive characteristics for the study sample of nativity, age of migration, age, and education by gender. The total Mexican-origin population in this study is 43 percent foreign-born and 57 percent U.S.-born. Approximately 60 percent of respondents are female compared to 40 percent males. However, stratified by gender, nearly 59 percent of female respondents are U.S.-born compared to 41 percent foreign-born with 10 percent having migrated during early life (1-19), 22 percent in midlife (20-49), and 9 percent in late life (50+), respectively. Conversely, 56 percent of male respondents are U.S.-born compared to 44 percent foreign-born (10 percent early life, 26 percent midlife, and 8 percent late life). Note that the foreign-born groups on the polar ends based on age at immigration to the United States account for the smallest shares of Mexican-origin elderly—those that immigrated to the U.S. as youth (at ages less than 19)

or as elderly (at age 50). There are no major gender differences in the distribution of the elderly across age of migration categories. Nonetheless, females (9.2 percent) are slightly more likely than males (8.3 percent) to have immigrated to the U.S. when they were 50 or older. The mean age for U.S.-born females (77.2 years) is slightly lower than foreign-born females (80 years, 77.9 years, and 78.5 years)). Similarly, the mean age of U.S.-born males (76.3 years) is slightly lower than foreign-born males (79.3 years, 77.4 years, and 77.5 years). In addition, mean years of education was higher among U.S.-born respondents than foreign-born respondents consistent with expectations that early life and mid life immigrants have more opportunities to incorporate into mainstream institutions than late life migrants.

Note also that individuals in the three foreign-born categories immigrated to the U.S. at different periods (see Table 2.2). Early life migrants generally arrived in the U.S. between the Mexican Revolution and the Great Depression. Midlife migrants tended to arrive between the end of World War II and Operation Wetback, at a time when the Bracero Program was in full force in the U.S. Although, a smaller portion immigrated to the U.S. between the mid-1950s and late 1960s, a period that saw the elimination of the Bracero Program and the enactment of Civil Rights legislation and immigration legislation that favored family reunification. Late life migrants generally came to the U.S. between the mid-1970s and late 1980s, a period that saw the enactment of the Immigration Reform and Control Act (IRCA) in 1986 which granted amnesty to many Mexicans who could prove that they had been in the U.S. on a continuous basis for at least five years. However, a sizeable proportion of males (23.9 percent) and females (30.6 percent) immigrated to the U.S. between 1991 and 1998, a period that saw economic expansion as well as welfare and immigration reform that made it more

difficult for U.S. citizens to sponsor relatives to enter the U.S. as well as making it more difficult for immigrants to draw social services (Espenshade and Huber 1998).

Table 2.2 further shows that early life immigrants are the oldest of this population with a mean age of 78.4 years at baseline, followed by late life immigrants (77.3 years). Mid life immigrants and U.S.-born Mexican elderly report a slightly younger mean age of 74.7 years each, respectively. Finally, in this sample a smaller proportion of mid life immigrants (57.2 percent) were deceased by wave 7 compared to U.S.-born (67.1 percent), early life immigrants (72.9 percent), and late life immigrants (64.9 percent). Clearly, mid life labor migrants are more select on mortality relative to other Mexican elderly subgroups. Interestingly, late life immigrants, those who came to the U.S. after the age of 50, have the second lowest proportion of deceased by wave 7 and also appear to be select on mortality. Conversely, early life immigrants are at a severe disadvantage and show no health selectivity compared to the U.S.-born and other immigrant subgroups.

Morbidity

The two panels of Table 2.3 present the prevalence of six self-reported medical conditions in three age categories among U.S.-born and foreign-born elderly grouped by age of migration. Note that for females (Panel A) with the exception of higher rates of cancer among U.S.-born females in the younger age category 65-74 compared to all foreign-born age of migration groups (11 percent vs. 1.4, 3.9, and 4.4 percent), lower rates of hypertension in the 75-84 age category between the U.S.-born and midlife migrants (62.9 percent vs. 66.3 percent), higher rates of hypertension in the 85+ age category between the U.S.-born and early life migrants (63.8 percent vs. 55.6 percent), lower rates of arthritis in the 75-84 age category between the U.S.-born and midlife

migrants (61.7 percent vs. 66.1 percent), and higher rates of diabetes in the youngest age category 65-74 between U.S.-born and mid and late life migrants (33.5 percent vs. 25.4 and 16.1 percent), there are no major nativity differences by age of migration in the distribution of morbidities across age categories. Among males (Panel B) a similar pattern can be seen with U.S.-born males reporting significantly higher rates of morbidity for cardio compared to midlife migrants (12.5 percent vs. 4.6 percent) in the 65-74 age category, higher rates of hypertension compared to early life migrants in the 65-74 age category and also early life and late life migrants in the 85+ age category, and lower rates of arthritis between U.S.-born and midlife migrants in both the 75-84 and 85+ age groups, and no other major nativity differences by age of migration. Overall, there are no clear patterns across the six types of self-reported medical conditions and age groups among females or male respondents. The healthy immigrant effect does not appear to be present among any age of migration groups for morbidity among elderly Mexican-origin respondents in this sample.

Disability

Table 2.4 presents the prevalence of age-adjusted rates of any ADL, IADL, and POMA disability among U.S.-born and foreign-born elderly subgroups by age of migration. For females (Panel A), both the U.S.-born and foreign-born age at migration groups report similar prevalence rates for any ADL in all age groups. No clear pattern emerges in the prevalence of any ADL disability among women. However, there are significant differences in the prevalence of any IADL disability between U.S.-born and foreign-born females by age of migration in the 65-74 and 75-84 year age categories. Late life immigrant females are the least health select among the foreign-born and report the highest prevalence rate of any IADL disability (69.9 and 77.8 percent), followed by

early life (62.8 and 75.3 percent) and midlife migrants (52.3 and 72.7 percent) compared to U.S.-born females (44.2 and 66.8 percent). These nativity and age of migration differences in IADL disability are largely driven by transportation, heavy housework, money management, and telephone use, with foreign-born females being at a disadvantage relative to the U.S.-born (results not shown). While all foreign-born females report significantly higher rates of any IADL disability and exhibit virtually no health selectivity relative to the U.S.-born, midlife migrants are clearly at an advantage and more select in the younger age groups (65-74 and 75-84) compared to early life and late life migrants. For functional mobility (POMA) disability a different pattern emerges with midlife immigrant women reporting statistically lower prevalence rates in the 65-74 age group relative to their U.S.-born counterparts (43.3 vs. 49.5 percent, respectively), and late life migrant women reporting statistically higher POMA disability in the 75-84 age category (72.3 vs. 58.1 percent). Mid life immigrant women are clearly more select on health in any POMA disability at younger ages compared to the U.S.-born and early life and mid life age of migration groups. Conversely, late life migrant women are the least health select in the 75-84 age group relative to U.S.-born and early life and mid life migrants.

For males (Panel B), no clear pattern emerges in the prevalence of any ADL disability with the exception of late life migrant males reporting lower levels of any ADL disability and exhibiting high health selectivity in the 75-84 and 85+ age categories compared to U.S.-born and early life and mid life migrant males. Similarly, differences in any IADL disability are only evident among late life male migrants in the 75-84 age group who report significantly higher rates on any IADL disability relative to the U.S.-born (60.1 vs. 49.5 percent). Finally, midlife migrant males in the 65-74 age group report significantly lower levels of POMA disability compared to the U.S.-born (34.6 vs. 44.8

percent, respectively). Mid life immigrants are also more health select on functional disability relative to early life and late life migrants.

Regression Models

The multivariate analysis is designed to examine the relationship between nativity and, for immigrants, age of migration and disability for Mexican-origin elders residing in the southwest United States. The analysis is stratified by gender because of the widely varying patterns of disability by sex. Table 2.5 shows the results from Poisson regression models predicting any ADL, IADL, or POMA disability. The first model documents the overall association between nativity, age of migration and disability, net of age group. In Model 2 I add controls for education to assess whether this key social factor is associated with disability. Finally, Model 3 includes the six self-reported chronic health conditions.

ADL Disability

The results in Panel A (Models 1 and 2) for females show that nativity and age of migration are not associated with any ADL disability, whereas age and education are positively related. In Model 3 female respondents who reported having a heart attack, stroke, hypertension, arthritis, or diabetes were between 20 percent and 64 percent more likely to report any ADL disability. Conversely, cancer is not associated with any ADL disability among females. For males (Panel B) nativity, age of migration, and age are positively related to any ADL disability. As a general rule, foreign-born males have a lower prevalence of any ADL disability relative to the U.S.-born. Foreign-born males who immigrated in early life are 24 percent less likely, midlife 23 percent less likely and late life migrants 47 percent less likely than U.S.-born males to report any ADL disability. When education is added to Model 2, nativity and age of migration become even more significant with U.S.-born males between 29 percent and 51 percent more

likely to report any ADL disability compared to their foreign-born counterparts. Clearly, education is very important for disability at older ages and is instrumental in explaining a great deal of nativity and age of migration differences in men's ADL limitations. In Model 3, stroke, cancer, hypertension, arthritis and diabetes are positive predictors (between 31 percent and 96 percent, respectfully) of any ADL disability among older Mexican-origin males. Having reported a heart attack is not associated with any ADL disability among males. After these controls are added nativity and age of migration remain significant only for midlife and late life migrants. Midlife migrants are 21 percent less likely and late life migrants are 49 percent less likely to report an ADL disability relative to U.S.-born males. The healthy immigrant effect on any ADL disability is evident among all age at migration groups for males. However, it is the late life male migrants that appear the healthiest (most select), followed by the midlife and early life immigrants.

IADL Disability

The results in Model 1 for females show that nativity and age are related to disability for any IADL in the expected direction. That is, nativity, age of migration and age are positively related to IADL disability for females. The risk of having any IADL disability is 16 percent, 10 percent, and 22 percent less likely, for U.S.-born females compared to early life, midlife, and late life migrant women. Foreign-born Mexican elder women show no health advantage by nativity and age of migration. After adding education in Model 2, nativity and age of migration lose some significance for early life and late life immigrant women and all significance for midlife immigrant women with education explaining part of the variation in any IADL disability. However, age is still a significant predictor of any IADL disability among the two older age groups. In Model 3 all self-reported medical conditions are positive predictors of any IADL disability among

older Mexican-origin women with the exception of cancer. Nativity and age of migration continue to remain significant with female early life immigrants 14 percent and late life immigrants 18 percent more likely to report any IADL disability relative to the U.S.-born counterparts. Midlife immigrants remain the most health select among foreign-born women with no statistical differences or disadvantages in any IADL disability relative to U.S.-born women. Foreign-born women who migrated in late life have consistently higher rates of disability compared to U.S.-born particularly with regards to IADL disability. In the case of males, the results show that nativity and age of migration are not associated with any IADL disability, though age and education are positively related. In Model 3, all but one measure of morbidity (hypertension) are significant predictors of any IADL disability among males. There are no signs of the healthy immigrant effect among foreign-born males by age of migration for any IADL disability.

POMA Disability

Model 1 shows nativity and age of migration is a significant predictor of POMA disability only for late life immigrant women. Late life foreign-born women are at a disadvantage and are 12 percent more likely than U.S.-born women to report any POMA disability. In Model 2 education is positively associated with any POMA disability and thus attenuates the variation between late life and U.S.-born Mexican elderly women. In Model 3, heart attack, arthritis and diabetes are positive predictors (between 13 percent and 22 percent, respectfully) of any POMA disability among older Mexican-origin females. Having reported a stroke, cancer or hypertension is not associated with any POMA disability among females. The regression analysis shows there is no immigrant advantage by age of migration among foreign-born females for functional limitation disability. For males, nativity, age of migration, education, heart attack, and hypertension are not associated with POMA disability. Conversely, having reported a stroke, cancer,

arthritis or diabetes increases the ratio of any POMA disability between 18 percent and 26 percent. Overall, there is no healthy immigrant effect by age of migration for male or female elderly Mexicans relative to their U.S.-born counterparts for any POMA disability.

DISCUSSION AND CONCLUSION

The U.S. Mexican-origin population has experienced rapid growth over the past several decades, with aging Mexican Americans composing a significant part of this increase. Despite these growing numbers there has been relatively little research that explores how nativity and for immigrants, age of migration, affect morbidity and disability outcomes of Mexican Americans across age groups in later life. This research sought to assess the healthy immigrant effect by nativity and age of migration in morbidity and disability outcomes among Mexican Americans 65 years and older, residing in the southwestern United States. This documentation and modeling further focused on nativity disparities by assessing age of migration specific to gender across three age groups that together constitute later life.

A life course perspective allows a closer examination of the role of age in the immigration process. This theoretical perspective argues that experiences at early states in the life course impact health outcomes in the later stages of life (Dannefer 2003; Elder, Johnson, and Crosnoe 2003; Coward et al. 1997; Hays and George 2002). The results presented provide evidence of how the life experiences of Mexican elderly were shaped by nativity and for immigrants, age at immigration to the U.S. What might account for the differences? I postulate that there are historical and social mechanisms at play that shape the disability status of Mexican elderly. The intersection between socialization and U.S. policies related to historical periods noted earlier illustrates how social and contextual conditions have shaped the lived experiences of the Mexican elderly. For

example, the elderly born in the U.S. and early life immigrants were socialized during the same historical period, so they shared somewhat similar social, political, and economic opportunities. This means that their experiences and opportunities were shaped by the Great Depression and immigration policies of the time that mostly relegated them to high risk injury promoting occupations (e.g., mining, farming, railroad construction, etc.) with a high likelihood of exposure to toxic materials and unsafe equipment. If one examines the various nativity and for immigrants, age of migration groups considered in this analysis; each is marked by their own particularities that have implications for disability status.

These findings have important implications for the "healthy immigrant" literature. In particular, this analysis contributes to ongoing discussions related to the degree to which Mexican elderly immigrants exhibit positive or negative health selectivity based on immigration status and time in the U.S. The results show that U.S.-born and foreign-born Mexican Americans, with a few exceptions, have similar prevalence rates for morbidity regardless of gender, and for immigrants, age of migration. In addition, the findings also point to the significantly higher rates of IADL disability for foreign-born women in later life, particularly for those who arrived in the U.S. after the age of 50 (less health selectivity). While all foreign-born women are disadvantaged relative to U.S.-born women, midlife migrants appear more health select in terms of any IADL disability, followed by early life immigrants. In large part these disabilities point to challenges driving a vehicle or obtaining transportation necessary for the everyday tasks of shopping, banking, and taking care of household business. Furthermore, foreign-born women do not exhibit any health selectivity for ADL and POMA disability. This is consistent with the literature that male immigrants are more likely to be select on health because they migrate for occupational purposes, while older female immigrants were

more likely to migrate to the U.S. for family reunification purposes and exhibited no health selectivity (Markides et al., 2007).

In contrast, foreign-born males appear to have rates of ADL and IADL disability that are similar to native-born males. However, there is a degree of health selectivity in functional limitations measured by POMA disability in the younger age category (65-74 years), particularly for midlife male migrants. Interestingly, migration selectivity is stronger for late life immigrants than early immigrants. This may reflect the fact that labor migrants are by definition healthy enough to migrate, work when they arrive, and are thus self-selected on the basis of good health, while early life immigrants are more likely to have accompanied their parents and have little or no selection because migration reflects their parents' characteristics (Angel et al., 2010; Breslau et al., 2009; Colon-Lopez et al., 2008; Gubernskaya, 2014). Overall, the results find nativity and age of migration to be an important predictor of IADL disability for foreign-born females, and ADL disability for native-born males. Similarly, the results provide a historical foundation for the existing age of migration literature. These findings also validate the limitations of previous research by illustrating that Mexican immigrants are not a homogeneous group and that migrant health selectivity depends on when and at what age they arrived in the United States.

There are several questions that emerge from this research that remain unanswered. First, it is important to have a better understanding of the work histories of the elderly, so that disability status could be contextualized. For example, if a Mexican male arrived in the U.S. under the Bracero Program it is fairly safe to assume that he was exposed to pesticides and other agents that can have both short and long term health effects. In addition, this type of work requires taxing physical assertion that may relate to their disabilities in later life. Second, at what point in the life course does an

"epidemiological crossover" take place since birthplace, age of immigration, and time in the United States (as individual factors or in combination) no longer serve as protective factors for those of Mexican-origin? This study brings to light these questions and certainly more research is needed that is mindful of the substantive policy implications. This is particularly paramount now more than ever with the recently established Affordable Care Act, current anti-immigrant sentiments, and the economic insecurities that are all part of the national discourse.

The current study is limited by self-reported measurements of medical conditions and disabilities. Although survey based assessment of morbidity and disability has been shown to be reliable in the United States (Katz et al., 1996; Simpson et al., 2004; Skinner et al., 2005), there could be some underreporting within the Latino population. Another limitation of this study is the cross-sectional design. While the HEPESE is a longitudinal dataset, individual data was aggregated and treated as cross-sectional (Hayward et al., 2014). Finally, this research drew comparisons by nativity and for immigrants, age of migration across age groups for the prevalence of morbidity and disability of Mexican Americans residing in the southwestern United States. The sample for this study is primarily of Mexican-origin, thus the results cannot be generalized to other Latino groups and may not be nationally representative.

Despite these limitations, the current study represents an important contribution to knowledge of the complex relationship between race/ethnicity, nativity, immigration and gender for aging Mexican-origin individuals. With a rapidly changing demographic profile that includes a large number of aging Mexican-origin immigrants, it is crucial that our society implement social and health policies aimed at ameliorating the negative health outcomes among immigrant and native-born minority groups that are documented in this study.

Table 1: Socio-demographic Characteristics Among Mexican-Origin Elders Age 65 and Older by Gender and N

	Females					Males					
	U.S.-Born	Foreign-Born				U.S.-Born	Foreign-Born				
Age of Migration		0-19	20-49	50+			0-19	20-49	50+		
N (%)	4,093 (58.8)	679 (9.8)	1,544 (22.2)	642 (9.2)		2,551 (55.9)	463 (10.1)	1,175 (25.7)	378 (8.3)		
Total Population					6,958					4,567	11,525
Age Group:											
65-74	36.3	25.2	39.1	28.5		43.1	28.3	36.5	35.7		
75-84	49.7	49.6	46.9	51.6		46.0	44.2	48.8	47.3		
85+	14.1	25.2	14.0	20.0		10.9	27.6	14.7	17.0		
Mean Age (SD)	77.2 (6.7)	80.0 (7.5)	77.9 (6.9)	78.5 (6.9)		76.3 (6.5)	79.3 (7.5)	77.4 (6.6)	77.5 (7.0)		
Mean Education (S	6.1 (4.1)	4.9 (3.5)	4.5 (3.5)	3.1 (3.2)		6.6 (4.5)	4.3 (3.7)	3.8 (3.4)	2.3 (2.6)		

Source: H-EPESE Waves 1-7.

*unweighted N's' weighted percentages and means

Table 2. Summary Characteristics of the Mexican Age of Migration Groups at Baseline.

Nativity and Age at Immigration	Mean Age	Pct. Distr.	Median Year	Range		25th Quartile Year	75th Quartile Year	Proportion Deceased
				Earliest Year	Latest Year			
Native-Born	74.7	57.1	----	----	----	----	----	67.1
Foreign-Born:								
Immigrated at 0-19	78.4	10.7	1924	1886	1948	1918	1935	72.9
Immigrated at 20-49	74.7	22.4	1955	1920	1979	1949	1962	57.2
Immigrated at 50+	77.3	9.8	1980	1920	2004	1974	1987	64.9
Total		100.0						

Table 3. Prevalence of Morbidities among Mexican-Origin Elders Age 65 and Older.

	Cardio				Stroke				Cancer				Hypertension				Arthritis				Diabetes			
	U.S.-Born	Foreign-Born			U.S.-Born	Foreign-Born			U.S.-Born	Foreign-Born			U.S.-Born	Foreign-Born			U.S.-Born	Foreign-Born			U.S.-Born	Foreign-Born		
Age Group:		0-19	20-49	50+		0-19	20-49	50+		0-19	20-49	50+		0-19	20-49	50+		0-19	20-49	50+		0-19	20-49	50+
Panel A: Females																								
65-74	7.9	4.4	7.3	4.9	4.0	4.6	4.9	5.3	11.0	1.4*	3.9*	4.4*	50.5	59.4	52.8	58.0	51.9	50.7	52.1	53.7	33.5	33.6	25.4*	16.1*
75-84	9.6	12.2	8.4	7.0	9.9	8.9	6.5	4.8	7.5	4.4	6.9	4.2	62.9	64.5	66.3*	61.9	61.7	64.3	66.1*	55.8	35.1	35.7	33.2	28.5
85+	8.8	7.8	10.1	9.3	9.7	8.4	8.2	12.0	8.4	9.4	9.2	7.0	63.8	55.6*	63.7	60.1	67.8	72.2	65.5	66.0	26.3	27.3	25.9	26.2
Panel B: Males																								
65-74	12.5	6.9	4.6*	7.2	8.1	3.3	5.1	6.4	6.1	4.6	3.2	4.7	39.7	32.5*	39.1	36.1	30.9	33.8	33.3	23.6	30.8	19.8	23.7	46.3
75-84	12.5	6.5	6.7	17.4	9.7	16.3	7.8	2.8	11.7	8.0	7.2	7.6	55.3	48.1	49.1	50.2	45.5	42.5	50.9*	41.0	31.3	32.0	22.7	39.6
85+	14.0	10.0	10.9	14.9	9.0	5.9	9.3	10.5	9.2	8.8	8.0	3.6	54.3	35.1*	63.6	35*	52.8	40.7	54.7*	45.1	28.1	22.0	31.5	17.6

Source: H-EPESE Waves 1-7.

Table 4. Prevalence of ADL Disability among Mexican-Origin Elders Age 65 and Older.

	Any ADL				Any IADL				Any POMA			
Age Group:	NB	0-19	20-49	50+	NB	0-19	20-49	50+	NB	0-19	20-49	50+
Panel A: Females												
65-74	7.5	8.8	6.7	12.0	44.2	62.8**	52.3***	69.9***	49.5	57.6	43.3*	55.3
75-84	23.4	21.8	26.8	28.7	66.8	75.3*	72.7*	77.8***	58.1	60.5	66.4	72.3***
85+	46.3	49.1	54.3	46.2	86.6	90.4	87.7	89.4	79.9	77.2	80.6	70.7
Panel B: Males												
65-74	5.9	3.1	4.0	4.1	28.8	21.7	28.4	32.6	44.8	43.7	34.6***	37.3
75-84	19.3	17.8	15.1	8.7*	49.5	47.8	51.3	60.1*	53.7	55.4	56.5	63.2
85+	42.1	30.3	34.3	26.7	75.0	70.1	74.6	78.3	66.4	62.5	71.2	68.4

Source: H-EPESE Waves 1-7 1994-2011.

Table 5. Poisson Regression (Rate Ratios) PredictingADL/IADL/POMA Disability amomg Mexican-Origin Elders Age 65 and Older.

	Any ADL			Any IADL			Any POMA		
Predictor Variables[ab]	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Panel A: Females									
Age of Migration									
0-19	1.00	0.97	0.99	1.16 **	1.14 *	1.14 *	1.04	1.03	1.03
20-49	1.11	1.06	1.09	1.10 *	1.06	1.06	1.03	1.00	1.01
50+	1.16	1.10	1.18	1.22 ***	1.15 **	1.18 ***	1.12 *	1.07	1.10
Age:									
70-74	3.25 ***	3.25 ***	2.91 ***	1.40 ***	1.40 ***	1.34 ***	1.26 ***	1.26 ***	1.24 ***
85+	6.72 ***	6.50 ***	5.75 ***	1.73 ***	1.69 ***	1.62 ***	1.59 ***	1.56 ***	1.55 ***
Education		0.98 *	0.99		0.98 ***	0.98 ***		0.98 ***	0.99 ***
Morbidities:									
Cardio			1.38 ***			1.16 **			1.22 ***
Stroke			1.32 **			1.14 *			1.10
Cancer			1.07			1.05			1.08
Hypertension			1.20 **			1.09 **			0.97
Arthritis			1.64 **			1.25 ***			1.15 ***
Diabetes			1.56 ***			1.15 ***			1.13 ***
Constant	0.06 ***	0.07 ***	0.04 ***	0.47 ***	0.54 ***	0.42 ***	0.48 ***	0.53 ***	0.45 ***
N	6958	6913	6792	6958	6913	6792	6958	6913	6792
Panel B: Males									
Age of Migration									
0-19	0.76 +	0.73 *	0.80	0.92	0.86 +	0.88	0.98	0.97	0.99
20-49	0.77 *	0.74 **	0.79 *	1.01	0.94	0.95	0.96	0.95	0.96
50+	0.53 ***	0.49 ***	0.51 **	1.15	1.01	0.99	1.03	1.01	0.99
Age:									
75-84	3.48 ***	3.50 ***	3.04 ***	1.78 ***	1.75 ***	1.67 ***	1.34 ***	1.34 ***	1.28 ***
85+	8.13 ***	8.05 ***	6.99 ***	2.62 ***	2.55 ***	2.48 ***	1.62 ***	1.62 ***	1.54 ***
Education		0.99	0.98		0.97 ***	0.96 ***		0.99	0.99
Morbidities:									
Cardio			1.23			1.20 **			1.09
Stroke			1.96 ***			1.45 ***			1.26 **
Cancer			1.39 *			1.21 *			1.19 *
Hypertension			1.31 **			1.02			1.05
Arthritis			1.40 ***			1.15 **			1.18 ***
Diabetes			1.44 ***			1.30 ***			1.23 ***
Constant	0.05 ***	0.05 ***	0.34 ***	0.28 ***	0.35 ***	0.29 ***	0.42 ***	0.43 ***	0.36 ***
N	4567	4532	4436	4567	4532	4436	4567	4532	4436

[a] The reference categories in the Poisson regression include: a) native-born persons; and b) persons 65-74 years of age.

*Significant at the 0.05 level. **Significant at the 0.01 level. ***Significance at the 0.001 level.

Chapter 3: Age of Migration, Disability and Active Life Expectancy among the Elder Mexican-Origin Population

INTRODUCTION

Latinos as a group enjoy surprisingly long life expectancies, despite a relatively disadvantaged socio-economic profile (Markides & Eschbach, 2005; Palloni & Arias, 2004). At age 65 Latino men have a remaining life expectancy of 19 years and Latinas 21.7 years compared to 17.1 for non-Latino white males and 19.7 for non-Latino white females (Arias, 2010). However, higher life expectancy among Latino groups does not necessarily coincide with overall favorable health since declines in mortality do not necessarily indicate that overall health has improved. Although longer life may be a goal in and of itself, the individual and social benefits of greater longevity may be undermined if the added years are characterized by high levels of chronic illness, functional limitations, and dependency (Guralnik, LaCroix, Branch, Kasl, & Wallace, 2001; Markides, Eschbach, Ray, & Peek, 2007). In fact, if mortality decreases while the incidence of chronic diseases increases or remains the same, the proportion of the population living in poor health will increase (Crimmins, 2004). For example, elderly Mexican immigrants have higher disability and functional limitations than U.S.-born non-Latino whites, even in the context of higher life expectancy among immigrants (Eschbach et al. 2007; Hayward et al. 2014).

A growing body of evidence indicates that among the older population at large, functional limitations and disability are declining (Crimmins & Saito, 2001; Crimmins, Saito, & L.Reynolds, 1997; Manton & Stallard, 1991). Although disability may be decreasing in general, recent evidence suggests that among Latinos, or at least certain

subgroups of Latinos, functional disability may be more common (Cantu, Hayward, Hummer, & Chiu, 2013; Gorin & Lewis, 2004; Hayward, Warner, & Crimmins, 2007; Markides, Escbach, Ray, and Peek, 2007). Previous research reveals that although the Mexican-origin population have relatively long life spans, relative to other racial and ethnic groups, this rapidly aging population is disproportionately beset by chronic diseases such as diabetes, hypertension and depression, as well as cognitive impairment (Caskie, Sutton, & Margrett, 2010; Gonzales et al., 2009; Hill, Angel, & Balistreri, 2012; Quiñones, Liang, Bennett, Xu, & Ye, 2011; Zeki et al., 2012). This high rate of chronic illness suggests that a large proportion of the years past 65 may be characterized by serious functional disability and severe frailty (Al Snih et al., 2009). In fact, recent research suggests that disability rates among elderly Mexicans has increased in recent years (Markides & Gerst, 2011).

Currently, most of the literature on disability differentials compares black and white populations (Crimmins & Beltrán-Sánchez, 2011; Hayward et al., 2007; Manton, Xiliang, & Lamb, 2006). Given the potential of higher rates of disability and an earlier onset among Mexican-origin elderly, this research examines nativity and age of migration differences in active life expectancy, by gender, based on Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) among Mexican-origin individuals 65 and older residing in the southwestern United States. The objective of this chapter is to assess whether the "healthy immigrant effect" that has been documented among immigrants in mortality extends to disability by examining the number of years past 65 lived with and without serious disability among elderly Mexicans (Markides & Eschbach, 2005). I document nativity and, for immigrants, age of migration disparities in the disabled and non-disabled life expectancy in the United States, specific to gender. I

distinguish among Mexican elderly by nativity: U.S.-born and for the foreign-born, by age of migration.

The rapid growth in the elderly Mexican population presents policy makers and health care professionals with an urgent need for research focused on the health of older Latinos. While interest in Latino health has been growing, large gaps remain in our understanding of the health status of this group, particularly Mexican Americans (Angel & Whitfield, 2007). Despite the growing numbers of Mexican-origin individuals in the United States, we understand little about how nativity and for immigrants, age of migration affect disability and mortality outcomes among Mexican-origin elders. Clearly, there are serious policy implications of research on the timing of immigration. There appears to be an emerging consensus that the physical health of immigrants (or most immigrants) to the United States and other developed nations is superior to the health of the native-born upon arrival (Markides & Rote, 2014). Major factors that contribute to this advantage include migration selection and better health behaviors. Health selectivity may vary considerably depending on age of migration as differences in motivation to migrate differ by age and gender across the life course.

This chapter contributes to the immigrant health literature in two key ways. First, I provide a more comprehensive documentation of nativity differentials than is typically the case by distinguishing subgroups of Mexican elderly by gender, nativity and age of migration. Second, I include two separate measures of functioning and disability: Activities of Daily Living (ADLs), Instrumental Activities of Daily Living (IADLs). Third, I use a life course framework to better assess the heterogeneity among the foreign-born elderly Mexican population and examine how age of migration affects health disparities in ADL and IADL disability. The inclusion of age of migration is particularly important in order to gain a better understanding of why nativity differences exist among

U.S.-born and foreign-born Mexican elderly (Hummer and Hayward, 2015, Gubernskaya, 2014; Angel, Angel and Markides, 2003).

I draw on a unique data set, the Hispanic Established Population for the Epidemiologic Study of the Elderly (H-EPESE) to address the following two questions: 1) to what extent does disabled and non-disabled life expectancy differ for Mexican elders residing in the United States by nativity and, for the foreign-born by age of migration segment of the population? and 2) to what extent does the healthy immigrant effect in mortality extend to disability among foreign-born elderly Mexican subgroups residing in the southwestern United States?

LITERATURE REVIEW

A growing body of literature on disability and functional limitations indicates substantial differences by race/ethnicity and nativity among the elderly U.S. population, with U.S.-born blacks and U.S.-born Latinos generally shown to suffer from higher rates of disability and functional limitations (Cantu et al., 2013; Geronimus et al. 2001; Hummer, Benjamin, and Rogers 2004; Melvin et al., 2014; Schoeni et al. 2005; Warner and Brown 2011). Indeed, nativity status has been found to have a strong relationship with individual health (Hummer and Hayward, 2015; Lariscy, Hummer, and Hayward, 2015; Angel, Angel, and Hill, 2014; Melvin et al., 2014; Markides and Gerst, 2011; Huh et al., 2008). For example, foreign-born immigrants are often shown to have lower mortality and to exhibit healthier profiles than their U.S.-born counterparts of the same race/ethnicity (Akresh and Frank 2008; Hayward and Heron 1999; Singh and Hyatt 2006). With rising rates of immigration we have seen increased interest in the socioeconomic situation of immigrants as well as their health status and health care

needs, and their impact on the host countries' health care system (Markides and Rote, 2014).

Latino health is a much more widely studied topic since immigration streams from Mexico and other areas of Latin America have led to rapid growth in the U.S. Latino population. Literature on Latino health is dominated by the concept of the epidemiological paradox. The Latino Paradox has been attributed to immigrant health selection, which also is present among other immigrant groups in the United States (Akresh and Frank, 2008). Specifically, researchers have found that Latinos in the U.S. fare comparably to non-Latino whites on many measures of health, including several morbidity measures, and all-cause mortality despite their low socioeconomic status (Markides and Eschbach, 2005). While Latinos are often lumped together, the overall Latino health advantage is largely driven by the Mexican-origin population which constitutes nearly two-thirds of the Latino population (Arias, 2010).

While there is a clear advantage in mortality and life expectancy among Mexican Americans the evidence is quite mixed with respect to other health indicators such as measures of morbidity, disability, and other outcomes (Markides & Rote, 2014). It appears that Mexican Americans are a long-living population primarily because of immigrant health selection (Arias, 2010; Markides and Eschbach, 2005). Mexican immigrants arrive in relatively good health relative to the U.S.-born population, but lose their advantage with time in the United States so that they become more disabled in late middle and old age largely because of a lifetime of physical labor and substandard and/or lack of medical care (Markides & Gerst, 2011) as well as changes in health behavior with negative acculturation (Antecol & Bedard, 2006). Recent research suggests there has been an increase in disability and also significant increases in the prevalence of diabetes,

hypertension, obesity, and cognitive impairment among older Mexicans residing in the United States (Markides & Gerst, 2011).

For example, Melvin et al. (2014) found that foreign-born Mexican-origin men and women ages 65 and older have significantly higher rates of ADL and IADL disability as well as functional limitations in comparison to non-Latino whites. In addition, Angel et al. (2014) found that although foreign-born Mexican women have longer life expectancies than both their male counterparts and U.S.-born Mexican women, they spend an overwhelming two-thirds of their remaining years after age 65 with a significant functional disability. In addition, this study documents that both foreign-born and U.S.-born Mexican men spend nearly half of their life after age 65 in a state of physical impairment. Moreover, they established that there are important interactions by nativity such that foreign-born Mexican women have the highest life expectancy and also the most years lived with a functional limitation. Similarly, Garcia and colleagues (2015) document that despite living relatively long lives, foreign-born Mexican men and women spend a longer proportion of later life with disability relative to their U.S.-born counterparts. This study found foreign-born women in particular spend a larger fraction of their elderly years with *both* ADL and IADL disability compared with U.S.-born women. Furthermore, this study shows that foreign-born males also spend a significantly larger fraction of their elderly lives with IADL disability compared with U.S.-born men. However, they also spend a significantly larger fraction of years after age 65 ADL disability free.

A related body of research has identified what has been called the "healthy immigrant effect" a term which refers to the favorable mortality experience among foreign-born individuals (Bostean, 2013; Hayward, Warner and Crimmins 2007; Markides and Gerst 2011; Palloni and Arias 2004; Riosmena and Dennis 2012; Akresh

and Frank, 2008; Singh and Hyatt, 2006). Perhaps reflecting the selection of healthy individuals into the immigrant population, or the fact that immigrants are less likely to smoke or engage in other health damaging behavior. Foreign-born individuals, and especially those who arrive after childhood, have life-expectancies at 65 that are similar or superior to those of non-Latino whites. Although the healthy immigrant effect has been clearly linked to mortality outcomes, it is less clear how it relates to morbidity, and particularly to functional capacity (Thomson, Nuru-Jeter Richardson et al., 2013).

Among studies of Latino immigrants, this protective effect is best documented among Mexicans, a group who are among the poorest and least educated population in the United States (Riosmena and Dennis 2012; Palloni and Arias, 2004; Rubio and Saenz, 2007; Telles and Ortiz, 2007). Recent research indicates that immigrant advantages in health and mortality may be influenced by differences in social and cultural characteristics and health related behaviors (Antecol & Bedard, 2006; Fenelon 2013; Hummer and Hayward 2015; Markides and Gerst 2011), such as a traditional diet, family structure and social networks that originate either in the receiving or sending country,(Acevedo-Garcia and Bates 2008; Hummer et al. 2007; Jasso et al. 2004; Markides and Gerst 2011; Palloni and Arias 2004; Landale, Oropesa, and Gorman 2000). However, any initial health advantage tends to deteriorate over time through negative acculturation processes, adoption of U.S. lifestyles in the host country (Antecol and Bedard, 2006; Gubernskaya, Bean, and Van Hook, 2013; Lariscy, Hummer, and Hayward 2013; Lopez-Gonzalez et al., 2005; Martinez et a. 2014; Markides and Gerst, 2011; Markides and Eschbach, 2005; Markides & Rote, 2015; Riosmena et al. 2014; Rumbaut, 1997). For example, evidence suggests that foreign-born Latinos are more likely to engage in negative health behaviors (smoking, alcohol consumption, and unfavorable dietary changes) with longer length of residence in the United States

(Antecol and Bedard, 2006; Akresh, 2007; Kimboro 2009; Lariscy et al., 2013; Turra and Goldman, 2007).

Following this interpretation, positive health selection, along with protective cultural aspects may contribute to a health advantage for U.S. Latino immigrants, which has been observed in several studies (Riosmena, Wong & Palloni, 2013; Palloni & Morenoff, 2001). Mexican immigrants who migrate to the United States are not thought to be a random cross-section of the origin population and are believed to be healthier than those left behind in their country of origin, and may indeed be healthier than the average individual in the receiving country (Bostean, 2013; Palloni & Arias, 2004). While evidence of a healthy immigrant effect among foreign-born Mexican-origin individuals residing in the United States has been accumulating, recent research suggests that immigrant mortality advantages are not reflected in disability relative to U.S.-born Latinos (Garcia et al., 2015; Hayward, Hummer, Chiu, Gonzalez & Wong, 2014; Cantu et al., 2013; Markides, Eschbach, Ray & Peek, 2007). Thus, comparing social and physical disability outcomes for foreign and U.S.-born individuals can highlight the importance of positive selectivity advantages and economic disadvantages among elderly Mexican by nativity, and age of migration.

Conceptual Framework

In this chapter I employ a life course perspective in order to test the "healthy immigrant effect," specific to age of migration, among foreign-born Mexican elderly subgroups. This framework aims to link migration, disability, and healthy aging. Migration it is a phenomenon that impacts individuals throughout the life course (Angel and Angel 1992). Motivations for migration vary by gender and age of migration (Angel, Angel, Lee and Markides 1999). The theoretical perspective I use asserts that people's

distal experiences in the area of socialization and stages in the life cycle impact health outcomes in the later stages of life (Dannefer 2003; Elder, Johnson, and Crosnoe 2003; Hays and George 2002). The life experiences of the Mexican elderly are likely shaped by where they are born and, for the foreign-born, the age at which they immigrated to the U.S. Using this conceptual framework, I seek to examine how the Mexican migration experience to the United States effects the health process, and the quality of life in old age by age of migration, specific to gender.

From a life course perspective, I argue that the life experiences of the foreign-born in the U.S. are likely to be shaped by the age at which they immigrated to the United States. Health selection quite likely operates differently for different age groups, as well and for men and women. For example, migration selectivity may be strongest in young and middle ages (20-49), when Mexican immigrants decide to cross the border to pursue occupational opportunities in agriculture, construction, and the service sector in which jobs can be physically demanding (Angel et al., 2010; Gubernskaya et al., 2013; Jasso et al., 2004). Labor migrants are healthy enough to migrate, work when they arrive, deal with the potential challenges they will face in the process of migration and in the receiving country, and are thus self-selected on the basis of good health and the desire to improve their situations (Angel et al., 2010).

In contrast, Mexicans who migrated to the U.S. in early life (ages 1-19) as children or adolescents are more likely to have been brought by their parents or relatives or tend to migrate in order to join family members already settled in the U.S. The early life migrants have little or no selection since their migration reflects their parents' characteristics and they do not necessarily have to meet the demands required for migration by themselves (Angel et al., 2010; Breslau et al., 2009; Colon-Lopez et al., 2008; Gubernskaya, 2014). In the same way, health selectivity may be weaker among

those who migrate in late life (50+) because older Mexican migrants are more likely to migrate for family reunification reasons rather than occupational opportunities (Angel et al., 2010; Jasso et al., 2004; Terrazas, 2009; Treas, 2014). In addition, negative health selection may be observed among some late life immigrants who come to the U.S.to seek care from family members.

DATA AND METHODS

Data

The objective of this chapter is to estimate the proportion of life spent in a disabled state prior to death for U.S.-born and foreign-born Mexican-origin men and women. Disability and mortality information is integrated to calculate healthy and unhealthy life expectancy for Mexican elderly. The integration of disability and mortality information allows us to identify whether the healthy immigrant effect in disability exists among U.S.-born and foreign-born Mexican elderly subgroups. This research employs data from the Hispanic Established Population for the Epidemiologic Study of the Elderly (H-EPESE) to estimate the proportion of life spent in a disabled state prior to death for U.S.-born and foreign-born Mexican-origin men and women by age of migration. The H-EPESE is a longitudinal cohort study of community-dwelling Hispanic elderly, aged 65 years and older, residing in the five southwestern states of Arizona, California, Colorado, New Mexico, and Texas (Markides et al. 1997). The H-EPESE has been used extensively to study the prevalence of disability among Mexican-origin adults in the U.S (Peek et al. 2003; Peek, Patel and Ottenbacher 2005).

These data provide detailed information on risk factors for physical illness and mortality for a sample of 3,050 individuals of Mexican-origin who were first interviewed in 1993-

94. This panel was re-contacted in 1995-96, 1998-99, 2000-01, 2004-05, 2007, and 2010-11. Because of attrition in the original cohort, a new cohort of 902 individuals who were the same age as the original cohort (75 or older at the time) was added in 2004 to increase sample size and statistical power. This new panel was re-contacted in 2007 and 2010-11. I use aggregated individual level data from 1993-2011 to obtain prevalence estimates across survey years, with mortality linkages through the National Death Index (NDI) up to Dec. 31, 2011. Respondents ranged in age from 65-107 years. The final analytic sample includes 3,952 unique individuals and 11,894 person-years of data.

Measures

Disability refers to limitations in performance of social roles and tasks in the context of the socio-cultural and physical environment (Spector and Fleisman 1998). Respondents were given a detailed interview about demographic characteristics, health status, impairments, and disabilities. Measures of disability included activities of daily living and instrumental activities of daily living. The survey measured seven ADL activities: walking across a small room (8-foot walk), bathing (either a sponge bath, tub, or shower), dressing (putting on a shirt, buttoning or zipping, or putting on shoes), eating (holding a fork, cutting food, or drinking from a glass), transferring from a bed to a chair, personal grooming (brushing hair), and using the toilet (Katz, Ford, Moskowitz, Jackson, and Jaffe 1963; Branch, Katz, and Papsidero 1984). For each of the seven items, respondents were asked to indicate if they could perform the activity without help, with help, or if they were unable to do it at all. ADL disability was dichotomized as no help needed versus needing help with or unable to perform one or more of the tasks. A positive response was coded as an ADL limitation.

Instrumental activities of daily living (Rosow and Breslau 1966; Lawton and Brody 1969; Fillenbaum et al. 1998) are self-report measures commonly used in studies that assess basic activities necessary to reside in the community. Similar to the ADLs, IADLs are intended to identify elderly individuals who are having difficulty performing important activities of living and may be at risk for loss of independence in the community (Ostir and DiNuzzo 2003). Ten IADL activities were measured: preparing meals, doing heavy housework (wash windows, wall and floors), walk up and down the stairs without help, doing light housework (dishwashing, bed making, etc.), shopping, managing money, taking medicines, telephoning, going places outside of walking (driving car or traveling on bus or taxi), and walk a half mile without help. Respondents were asked to indicate if they could perform the activity without help or if they were unable to do the activity at all. IADL disability was dichotomized as no help needed versus unable to perform one or more of the tasks. A positive response was coded as an IADL limitation.

Socio-demographic Characteristics

Two measures of immigration status are included in this study. To classify nativity, I use birth place information and categorize those respondents born in the U.S. versus born in Mexico. To measure life course stage at migration, I include three age of migration groups; those who arrived in childhood (1 – 19 years); middle age (20-49 years); and those who arrive in later life (after age 50). Mexicans involved in the migration process are not a monolithic group, rather a heterogeneous in various aspects. Although the factors that contribute to this heterogeneity are studied less, some scholars suggest age of migration can be useful for understanding health disparities in later life by approximating type of migration (i.e. labor versus family) and the degree of selectivity

among immigrants (Markides & Rote, 2014; Gubernskaya 2014; Hummer and Hayward, 2015).

Statistical Analysis

The study combines age-specific mortality rates with age-specific prevalence of ADL and I-ADL disabilities to calculate Sullivan-based multistate life table models of ADL and IADL disabilities free and life expectancy with ADL and IADL for each group (Sullivan, 1971). This technique is a prevalence-based method of estimating healthy life expectancy. This method divides total life expectancy into the different health states based on the age-specific prevalence of disabled (with ADL and IADL) and non-disabled (ADL and IADL free) states.

To estimate mortality rates, Gompertz models of the following form stratified by sex and nativity are employed.

$$\log m(x_i) = b_0 + b_1 \text{age}_i \quad (1)$$

where, x is age $m(x)$ is age-specific mortality rate, β_0 is the constant term and β_1 is the coefficient for age (Teachman and Hayward 1993).

To estimate prevalence, the logistic regressions of the following form stratified by sex and nativity are fitted.

$$\log\left(\frac{p_i}{1 - p_i}\right) = b_0 + b_1 \text{age}_i \quad (2)$$

where, π is the prevalence.

By using equation (1), age-specific mortality rates can be estimated and total life expectancy is obtained. From equation (2), the age-specific prevalence of ADL and I-

ADL is obtained. The estimated prevalence is used to divide total life expectancy into the different health states based on the age-specific prevalence of disabled (with ADL and IADL) and non-disabled (ADL and IADL free) states. Disabled/Non-Disabled life expectancy calculated by this method is the number of remaining years (at a specific age) which a population can expect to live in a disabled/non-disabled state (Jagger et al. 2006). For additional detail, please refer to Jagger et al., (2006).

A bootstrapping technique will be used to obtain standard errors for the total life expectancy, disabled life expectancy and non-disabled life expectancy. Bootstrapping generates repeated estimates of non-disabled life expectancy by randomly drawing a series of bootstrap samples from the analytic samples. Repeating this approach 300 times, distributions of total life expectancy, disabled life expectancy and non-disabled life expectancy are obtained, which allow me to estimate sampling variability for total life expectancy, healthy life expectancy and unhealthy life expectancy. Based on the 300 life tables for a given group, confidence intervals will be obtained for the distributions of the total life expectancy, healthy life expectancy and unhealthy life expectancy for that group.

I use the formula below to calculate confidence intervals.

$$X \pm Z_{a/2}\mathrm{SE}(X) \qquad (3)$$

Where, X is Total Life Expectancy, Health Life Expectancy, Unhealthy Life Expectancy, or Ratio of Healthy to Total Life Expectancy. SE is the standard error of X. The 95%, 99%, and 99.9% confidence intervals can be obtained by using When $\alpha = 0.05$, 0.01, and 0.001 respectively.

Results

Descriptive Statistics

Table 3.1 reports descriptive characteristics for the study sample of nativity, age of migration, age, and education by gender. The total Mexican-origin population in this study is 43 percent foreign-born and 57 percent U.S.-born. Approximately 60 percent of respondents are female compared to 40 percent males. However, stratified by gender, nearly 59 percent of female respondents are U.S.-born compared to 41 percent of foreign-born with 10 percent having migrated during early life (1-19), 22 percent in midlife (20-49), and 9 percent in late life (50+), respectively. Conversely, 56 percent of male respondents are U.S.-born compared to 44 percent of foreign-born (10 percent early life, 26 percent midlife, and 8 percent late life). Note that the foreign-born groups on the polar ends based on age at immigration to the United States account for the smallest shares of Mexican-origin elderly—those that immigrated to the U.S. as youth (at ages less than 19) or as elderly (at age 50). There are no major gender differences in the distribution of the elderly across age of migration categories. Nonetheless, females (9.2 percent) are slightly more likely than males (8.3 percent) to have immigrated to the U.S. when they were 50 or older. The mean age for U.S.-born females (77.2 years) is slightly lower than foreign-born females (80 years, 77.9 years, and 78.5 years)). Similarly, the mean age of U.S.-born males (76.3 years) is slightly lower than foreign-born males (79.3 years, 77.4 years, and 77.5 years). In addition, mean years of education was higher among U.S.-born respondents than foreign-born respondents consistent with expectations that early life and mid life immigrants have more opportunities to incorporate into mainstream institutions than late life migrants.

Table 3.2 presents estimates of life expectancy for men and women at age 65, as well as the average number of years spent with and without any ADL disability. The analysis is stratified by nativity and for the foreign-born by age of migration to determine

whether an immigrant advantage emerges. Overall life expectancy for the foreign-born is modestly higher than the U.S.-born. Among women, total life expectancy at age 65 is slightly higher 18.7 years (late life), 18.4 years (mid life), and 18.2 years (early life) for the foreign-born than for the U.S.-born (17.9 years), and this relatively small difference is not statistically significant. Likewise, no statistically significant differences emerge in active life expectancy in any ADL disability. However, foreign-born women who migrated in mid and late life experience a significantly higher ($p < .05$) number of elderly years spent with ADL disability than U.S.-born women (5.1 and 4.9 years vs. 4.4 years). Similarly, there are statistically significant differences ($p < .05$) in the ratio of number of years lived with ADL disability to the total number of years lived between late life foreign-born and U.S.-born women. The results indicate that late life foreign-born women spend 73 percent of their remaining years after age 65 in a healthy state compared with 75 percent for the U.S.-born. Immigrant women exhibit no health selectivity in active life expectancy with any ADL disability, by age of migration. In fact, the opposite is true mid life (20-49 years) and late life (50+) immigrant women are at a disadvantage in total years spent in a disabled state, and for late life immigrant women, proportion of years spent in a disabled state.

A different pattern emerges for men. The foreign-born have a significant advantage ($p < .001$) in total life expectancy over the U.S.-born. Results show that at age 65, foreign-born males can expect to live an additional 15.9 years (early life), 17.1 years (mid life), and 18.3 years (late life) more compared with 14.8 years for the U.S.-born. Furthermore, foreign-born males spend a greater amount of time healthy 13.2 years (early life), 14.2 years (mid life), and 15.2 years (late life) than the U.S.-born. Furthermore, statistically significant differences emerge in the number of years spent with ADL disability between late life immigrants (3.1 years) and U.S.-born (2.6 years) males. In

addition, Table 2 shows that the ratio of the number of years lived with ADL disability to the total number of years lived is largely similar for foreign-born and U.S.-born men. Immigrant men are clearly select in total and active life expectancy. These results are rather unexpected. Late life immigrant men appear to have more health selectivity among foreign-born males followed by mid life and early life migrants.

The right side of Table 2 present estimates of life expectancy for men and women at age 65, as well as the average number of years spent with and without any IADL disability. Life expectancy for both foreign-born and U.S.-born Mexican elderly men and women are identical to the previous analysis. Among women, active life expectancy at age 65 is 7.4 years for the U.S.-born compared with 6.7 years for early life ($p < .05$), 6.2 years for mid life ($p < .001$), and 5.6 years for late life immigrants ($p < .001$). Foreign-born women 11.4 years (early life), 12.3 years (mid life), and 13.1 years (late life), also spend a larger fraction of their elderly years with IADL disability than U.S.-born women ($p < .001$). Furthermore, Table 2 reveals statistically significant differences ($p < .001$) in the ratio of number of years lived with IADL disability to the total number of years lived. Foreign-born females spend between 30 percent and 37 percent of their remaining years after age 65 in a healthy state compared with 41 percent for U.S-born women. All foreign-born women are negatively select on IADL disability regardless of age of migration. Although, a general pattern emerges with early life and mid life migrant women being more select relative to late life migrant women.

For men, a slightly different pattern emerges. Foreign-born males 6.7 years (early life), 7.7 years (mid life), and 8.7 years (late life), spend a significantly larger number of years with IADL disability than the U.S.-born (5.9 years). In addition, the ratio of number of elderly years lived with IADL disability to the total number of years lived is lower for foreign-born men compared with U.S.-born men. Foreign-born men spend 58 percent

(early life), 55 percent (mid life), and 53 percent (late life) of their remaining years in a healthy state compared with 61% for U.S.-born men. Conversely, there are no statistically significant differences in active life expectancy among foreign-born and U.S.-born men. Immigrant men exhibit no health selectivity in IADL active life expectancy. In fact, the results point in the opposite direction. Similar to foreign-born Mexican women, immigrant men appear to be negatively select in years spent with an IADL disability and the proportion of years after 65 in a disabled state.

DISCUSSION AND CONCLUSION

The United States Latino population has experienced unprecedented growth in the past several decades. Although the Latino population remains relatively young as the result of high fertility and immigration, it is aging along with the rest of the population. One distinguishing feature of the Latino population is that despite relatively low levels of material wealth and education, Latinos have longer life expectancies at birth and at 65 than non-Latino whites. The combination of a relatively unfavorable socioeconomic and educational profile and long life expectancies raises fundamental questions concerning health and functional capacity in old age. Although the Latino mortality advantage has been widely documented, there has been relatively little research on functional capacity in old age, or on the fraction of years after 65 characterized by functional incapacity or limitations.

This analysis examines nativity and age of migration differences in active life expectancy, by gender, based on Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) among Mexican-origin individuals 65 and older residing in the southwestern United States to assess whether the "healthy immigrant effect" that has been documented among immigrants in mortality extends to disability by

examining the number of years past 65 lived with and without serious disability among elderly Mexicans (Markides & Eschbach, 2005). Previous research has focused on comparing active life expectancy across racial and ethnic groups, but few studies have focused specifically on the healthy and unhealthy life expectancy in disability outcomes among Mexican-origin elders as a function of nativity, and for immigrants, age of migration. This documentation further focused on nativity disparities by assessing age of migration specific to gender across three age groups that together constitute later life.

These results are consistent with previous findings that foreign-born individuals residing in the United States have lower mortality and are more select on health than their U.S.-born counterparts (Singh & Hyatt, 2006). As other studies increasingly show, the healthy immigrant effect does not appear to apply to disability, with the exception of ADL disability among immigrant males (Cantu et al., 2013; Hayward et al., 2014; Markides & Rote 2014; Melvin et al., 2014; Eschbach et al., 2007). While foreign-born Mexican elderly live longer, they are more likely doing so in a disabled state. A life course perspective allows a closer examination of the role of age of migration in the immigration process. This perspective argues that experiences at early stages in the life course impact health outcomes in the later stages of life (Dannefer 2003; Elder, Johnson, and Crosnoe 2003).

The results presented provide evidence of how the life experiences of Mexican elderly were shaped by nativity and for immigrants, age at immigration to the U.S. Foreign-born women in particular spend a larger fraction of their later years with both ADL and IADL disability than U.S.-born women and there are important differences by age of migration. Immigrant women who arrive in the U.S. during early life are not statistically different than U.S.-born women in ADL disability. However they are more health select than mid life and late life immigrant women in terms of total years and ratio

of life spent in a disabled state. Similarly, while all immigrant women are negatively select on IADL disability in terms of years spent in a healthy and unhealthy state, and ratio of years spent after age 65 in an active state, early life immigrants exhibit the healthiest outcomes, followed by midlife and late life immigrant women in terms of IADL disability.

Foreign-born males also spend a significantly larger fraction of their later years with IADL disability than U.S.-born men. As with women, they do not exhibit health selectivity relative to the U.S.-born by age of migration groups for any IADL disability. Indeed, all age of migration groups follow a similar pattern with early life (1-19) and mid life (20-49) male immigrants appearing more health select in total years and ratio of years spent in a disabled state. However, they also spend a significantly larger fraction of healthy years ADL free. Foreign-born immigrants males are largely health select by nativity, and for immigrants, age of migration in total life expectancy and active life expectancy in years lived at age 65 with an ADL disability. Late life male migrants are the most health selected among this group, followed by mid life and early life immigrants compared to U.S.-born males.

Why would foreign-born Mexican immigrants experience high life expectancy and yet have high prevalence of ADL and IADL disability? A likely explanation is linked directly to the historical time period and government policy under which many Mexican individuals migrated to the United States. For example, over 50 percent of immigrants both males and females in this sample migrated to the U.S. during the era of the Bracero Program (1942-1964). The Bracero Program was initiated by the U.S. government in response to wartime labor shortages in the agricultural industry, which led to legislation for the temporary migration for Mexican farmworkers. Over the program's 22 year life, more than 4 million Mexican immigrants were legally contracted to work in the U.S.

Indeed, the Bracero Program laid out immigration pathways that continued after the program ended.

This cohort of Mexican labor workers most likely spent decades performing physically demanding labor, with limited access to health care, substandard and overcrowded living conditions, and few labor laws to protect them (Massey, 2002). This explanation for the high proportion of years spent with a disability as evidenced in the results for Mexican immigrants at ages 65 and older is consistent with the conditions a significant proportion of immigrants were subjected to upon arrival in the U.S. in this particular cohort. Thus, their disability is most likely tied to hazardous working conditions and not necessarily an exclusive result of poor health caused by chronic disease. However, it is important to note that foreign-born males are indeed select on health in terms of total life expectancy and also years spent in an ADL non-disabled state. The results indicate that there is a healthy immigrant effect by age of migration groups among males whereas those who migrated at later stages during the life course exhibit healthier mortality and ADL disability outcomes. These results are consistent with previous findings that support a slight foreign-born advantage among men relative to their U.S.-born counterparts (Garcia et al., 2015; Markides et al., 2007). As with previous research, this health advantage was found only among immigrant men and a not immigrant woman which lends support to the idea that older immigrant men are health select because they migrate primarily for occupational opportunities, while older immigrant women are more likely to migrate for family reunification purposes.

Furthermore, high rates of IADL disability among foreign-born men and women may be attributed largely to the problems they encounter driving a vehicle or obtaining transportation, areas in which they are clearly handicapped (Angel, Angel, McClellan & Markides, 1996). For example, Garcia et al., (2015), found acculturation, measured by

English proficiency to play an important role in IADL disability among both male and female Mexican immigrants. These results illustrate that acculturation interacts with nativity and that lower English proficiency magnifies the disparity in IADL disability for foreign-born men and women. Thus, while foreign-born Latinos of Mexican-origin live longer, the evidence clearly shows that the survival benefit appears to dissipate over time, as they spend more of those years disabled.

These findings have important research and policy implications. Prevention and treatment of medical conditions should be given high priority in this population to reduce disability to the extent possible. Disability is a major driver of acute and chronic health care costs. Given the socioeconomic profile of the Mexican-origin population, protracted disability will translate into increasing Medicare and Medicaid expenditures. The robust relationship between nativity, age of migration and unhealthy life expectancy means that the foreign-born may place particularly serious burdens on state and family finances. The potential magnitude of the problem is dramatized by the fact that over fifty-percent of the H-EPESE survivors rely primarily on Medicaid for their health care needs.

The IADL disability results demonstrate the importance of considering nativity, and for immigrants, age of migration and gender when planning for long-term care in the growing elder Mexican-origin population. The possibility of a longer life characterized by compromised health and material hardship raises serious questions about the potential burden on government and family. The family plays a critical role for individuals of Mexican descent in providing social support for elderly parents given that they tend to strongly resist going to nursing homes. As these data suggest, as they grow older, Mexican immigrant families will need to mobilize their support systems since they will be heavily burdened with physical and cognitive impairments. Future research should also investigate the various ways in which nativity, age of migration and gender are

influenced by specific ADL and IADL domains and overall healthful aging. These issues merit critical attention since they will likely be expensive for our society and will quite likely a burden for the younger family members who provide care for their Latino elders.

Table 1: Socio-demographic Characteristics Among Mexican-Origin Elders Age 65 and Older by Gender and N

	Females				Males			
	U.S.-Born	Foreign-Born			U.S.-Born	Foreign-Born		
Age of Migration		0-19	20-49	50+		0-19	20-49	50+
N (%)	11,894 (58.8)	2,017 (9.8)	4,416 (22.2)	7,497 (9.2)	7,497 (55.9)	1,321 (10.1)	3,246 (25.7)	1,149 (8.3)
Mean Age (SD)	77.2 (6.7)	80.0 (7.5)	77.9 (6.9)	78.5 (6.9)	76.3 (6.5)	79.3 (7.5)	77.4 (6.6)	77.5 (7.0)
Mean Education (S	6.1 (4.1)	4.9 (3.5)	4.5 (3.5)	3.1 (3.2)	6.6 (4.5)	4.3 (3.7)	3.8 (3.4)	2.3 (2.6)

Source: H-EPESE Waves 1-7.

*unweighted N's' weighted percentages and means

Table 1 - ADL and IADL Active Life Expectancy at Age 65 by Nativity, Age of Migration, and Gender

	ADL				IADL			
	Native-Born	**0-19**	**20-49**	**50+**	**Native-Born**	**0-19**	**20-49**	**50+**
Females	**Years (SE)**	**Years (SE)**	**Years (SE)**	**Years (SE)**	**Years (SE)**	**Years (SE)**	**Years (SE)**	**Years (SE)**
Total Life Expectancy	17.9 (0.28)	18.2 (0.24)	18.4 (0.32)	18.7 (0.46)	17.9 (0.28)	18.2 (0.24)	18.4 (0.32)	18.7 (0.45)
Active Life Expectancy	13.5 (0.23)	13.5 (0.19)	13.6 (0.25)	13.6 (0.36)	7.4 (0.22)	6.7 (0.17)*	6.2 (0.22)***	5.6 (0.30)***
Disabled Life Expectancy	4.4 (0.16)	4.6 (0.14)	4.9 (0.19)*	5.1 (0.30)*	10.5 (0.24)	11.4 (0.21)**	12.3 (0.30)***	13.1 (0.45)***
Ratio of Active to Total	0.75 (0.01)	0.74 (0.01)	0.74 (0.01)	0.73 (0.01)*	0.41 (0.01)	0.37 (0.01)**	0.33 (0.01)***	0.30 (0.01)***
Males								
Total Life Expectancy	14.8 (0.27)	15.9 (0.27)**	17.1 (0.39)***	18.3 (0.57)***	14.8 (0.27)	15.9 (0.27)**	17.1 (0.39)**	18.3 (0.57)***
Active Life Expectancy	12.3 (0.25)	13.2 (0.24)**	14.2 (0.34)***	15.2 (0.49)***	9.0 (0.22)	9.2 (0.19)	9.4 (0.26)	9.6 (0.38)
Disabled Life Expectancy	2.6 (0.14)	2.7 (0.12)	2.9 (0.16)	3.1 (0.33)*	5.9 (0.22)	6.7 (0.19)**	7.7 (0.30)***	8.7 (0.46)***
Ratio of Active to Total	0.83 (0.01)	0.83 (0.01)	0.83 (0.01)	0.83 (0.01)	0.61 (0.01)	0.58 (0.01)	0.55 (0.01)***	0.53 (0.02)***

Source: HEPESE Wave 1-7

*p≤=0.05 **p≤=0.01***p<=0.001 (Nativity Differentials)

Chapter 4: Disability Trajectories by Age of Migration among Mexican Elders in the U.S.

INTRODUCTION

The United States population is rapidly aging. With increasing age, many elderly individuals experience disability and lower levels of functioning. It is estimated that roughly one-half of individuals 65 and older in the United States have a disability (U.S. Census Bureau, 2012). While research on disability has expanded over the last several decades, less is known about minority and immigrant elderly. This is particularly true of persons of Mexican-origin relative to other racial groups. Research suggests that elderly Mexican-origin individuals tend to enter their later years in life with limited economic resources which is associated with negative health outcomes (Angel and Angel, 2006; Angel et al., 2001). Nonetheless, one of the most intriguing findings in the health and mortality literature is the epidemiological paradox (also known as the "Latino paradox"). This paradox describes the unexpected favorable health outcomes of Latinos, especially persons of Mexican-origin, in light of limited socioeconomic resources. In addition, studies consistently find that Latinos who immigrate to the United States are often healthier than their U.S.-born counterparts. This "healthy immigrant effect" can be seen across a range of health-related outcomes, though is generally found to be smaller for individuals who migrate at older ages since they likely migrate for family reunification purposes rather than for employment opportunities (Jasso et al., 2004; Markides et al., 2007).

Selective migration is thought to shape the health profiles of Mexican immigrants. Researchers speculate that individuals who migrate are not a random-cross section of their origin population, and tend to be healthier, on average, than non-migrants and their

U.S.-born counterparts (Jasso 2004). Although immigrants are initially healthier upon arrival, this apparent health advantage tends to dissipate with length of residence in the U.S. (Antecol and Bedard, 2006; Lopez-Gonzalez et al., 2005; Vega and Amaro, 1994). Previous research has shown U.S.-born Mexican elderly have a health profile more indicative of their minority and lower socioeconomic status while foreign-born Mexican elderly have much more favorable mortality and health profiles (Cantu et al., 2013). However, while much debate exists related to the "healthy immigrant effect" there is also a growing body of evidence that suggests that foreign-born Mexicans who live longer tend to have a greater prevalence of disability and functional limitations (Angel et al., 2015; Garcia et al., 2015; Markides et al., 2007; Melvin et al., 2014; Cantu, Hayward, Hummer and Chiu, 2013; Hayward, Hummer, Chiu, Gonzalez and Wong, 2014). However, there is fairly limited research on the extent to which the healthy immigrant effect holds among older Mexican-origin immigrant subgroups relative to their U.S.-born counterparts. The protective health benefits of immigration may not occur until Mexican immigrants enter their later years of life.

One of the major distinguishing features of the Mexican-origin elderly population is their diversity on the basis of nativity and temporal presence in the United States. While many Mexican-origin elders were born in the United States and others came during the early parts of the 20th century when they were young, many others immigrated as adults including those who entered the country during their later years in life. Despite the increasing interest on how nativity status affects life experiences of Mexicans, there has been relatively little research on how age of migration affects health outcomes of elderly Mexicans. This analysis focuses on the development of age of migration categories based on the age when Mexican elderly arrived in the United States. I then examine the nativity and for immigrants, age of migration categories on the basis of

disability status. This research is particularly interested in how Mexicans who immigrated to this country at age 50 and older fare compared to their U.S.-born counterparts as well as to their foreign-born peers who migrated to this country at a younger stage of their lives. Individuals who immigrated while elderly (50+) are of interest because the move to the U.S. may be driven by health related conditions which can be better addressed in the United States. Moreover, this study also seeks to document how early life Mexican immigrants (foreign-born individuals who came to the U.S. when they were 1 to 19 years of age) compare to their U.S.-born counterparts. This interest stems from findings in recent research that reveal foreign-born individuals have advantageous health outcomes compared to U.S.-born persons (Singh and Hiatt 2006; Finch et al. 2009; Kimbro 2009; Padilla et al. 2009; Sanders 2010; Tillman and Weiss 2009) and that the advantage declines with time in the United States (Antecol and Bedard 2006; Finch et al. 2009; Kimbro 2009). Thus, this analysis will provide knowledge on whether or not the advantages of the foreign-born—especially those involving early life migrants which are the most like the U.S.-born population—are long term.

This analysis draws on the life course perspective which argues that people's early life experiences in the area of socialization and stages in the life cycle impact health outcomes in the later stages of life (Crosnoe and Elder, 2004; Dannefer, 2003). This perspective is particularly useful in the examination of the age at which immigrants arrive in the United States. This study aims to contribute to the immigrant literature by examining whether the "healthy immigrant effect" that has been documented among immigrants in mortality extends to disability by examining the functional limitation trajectories past 65 lived with and without serious disability (Markides and Eschbach, 2005). I draw on a unique data set, the Hispanic Established Population for the Epidemiologic Study of the Elderly (H-EPESE) to address the following two questions:

1) to what extent does functional disability trajectories differ for Mexican elders residing in the United States by nativity and, for the foreign-born by age of migration segment of the population? and 2) to what extent does the healthy immigrant effect in mortality extend to disability trajectories among foreign-born Mexican subgroups residing in the southwestern United States?

LITERATURE REVIEW

Recent research shows the healthy immigrant effect evident in mortality and life expectancy among foreign-born Latino and Mexican elderly is not reflected in disability rates (Markides and Rote, 2014). It appears that foreign-born Mexicans are a long living population primarily because of immigrant health selection (Arias, 2010; Markides and Eschbach, 2005). Mexican immigrants arrive in the United States in relatively good health but lose their advantage with time in the United States so that they become more disabled in late life than the non-Latino white population partly because of a lifetime of physical labor and substandard health care (Markides and Gerst, 2011). A growing body of literature documents higher rates of disability for U.S.-born and foreign-born Latinos compared to U.S.-born whites (Hayward et al 2014; Angel, Angel, and Hill 2014; Zsembik Peek and Peek 2000). More specifically, recent research on functional health status indicates substantial differences by race/ethnicity and nativity among the elderly U.S. population, with U.S.-born Latinos generally shown to suffer from the poorest outcomes (Hummer, Benjamin, and Rogers 2004; Warner and Brown 2011).

In comprehensive surveys such as the National Health Interview Survey, Mexican individuals are more likely to report activity limitations when compared to individuals from other racial or ethnic groups (Melvin et al., 2014; Hummer et al. 2004). Further, data from the Hispanic Established Population for Epidemiologic Studies for the Elderly

(H-EPESE) shows that older Mexican Americans are more likely to report disabilities in activities of daily living (ADL) and in instrumental activities of daily living (IADL) than their non-Latino counterparts (Markides and Gerst, 2011). Although these national surveys provide us much insight about the disability status of Mexican elderly, the immigration and age of migration heterogeneity among this population remains relatively unexplored.

In a recent study, Markides et al. (2007) use the PUMS data to assess disability rates among elderly Latino- origin individuals accounting for nativity status. Consistent with prior research this study illustrates that Latinos, regardless of gender, are more likely to report disabilities than non-Latino whites on each of the disability outcomes. Upon a closer examination of nativity for Latinos, the investigators report that U.S.-born Latino males and females are more likely to report "any disability" than their foreign-born counterparts. When they examine Latino ethnic specific outcomes, the investigators note that U.S.-born Mexican males report higher rates of "any disability" (51.4 percent) than their foreign-born counterparts (49.4 percent). This pattern is not found for U.S.-born Mexican females who are less likely to report "any disability" (53.4 percent) than their foreign-born (54.4 percent) counterparts. Similarly, Cantu et al., (2013) found that foreign-born Latinos have the longest life expectancies at age 50 and have a lower prevalence of morbidity and functional limitations compared to non-Latino whites. Importantly, this study also demonstrated that U.S.-born Latinos do not share the same health advantages of their foreign-born counterparts.

Conversely, Hayward and colleagues (2014) found that foreign-born Latinos exhibited the greatest burden of disability among all racial/ethnic groups in terms of number of years of life spent with an activity of daily living limitation. This study found support for the Latino Paradox in mortality, but not in disability. In addition, they showed

that while U.S.-born Latinos have mortality rates comparable to whites, they also spent more years in a disabled state. This is particularly the case in the Mexican-origin population, a group that constitutes approximately two-thirds of the Latino population in the United States (Markides and Rote, 2015). It appears that immigrants from Mexico arrive in relatively good health but lose their advantage with time in the United States (Antecol and Bedard, 2006; Gubernskaya, Bean, and Van Hook, 2013). Several additional studies (Angel et al., 2014; Garcia et al., 2015) also document important interactions by nativity. For example, foreign-born Mexican-origin women have the highest life expectancy and also spend a larger portion of their years after age 65 with IADL and functional limitation disability relative to their co-ethnic group members. Although these studies provide useful epidemiological information, a notable limitation is that the investigators did not examine the heterogeneity within the foreign-born population in terms of disability status by time of migration.

In summary, some research suggests that older Latinos have worse health (i.e., more disabilities) than their non-Latino counterparts. In studies where nativity status is examined, U.S.-born Mexicans have worse ADL and functional disability than their foreign-born counterparts; however, often length of U.S. residence is not accounted for. In studies that consider ethnicity and immigration status, often Mexicans who immigrate to the United States when they are older are found to have worse health than those who immigrated at a young age. This research adds to the small, but growing, literature that seeks to understand the health of Latino elderly, with a focus on the identification of Mexican elderly along the lines of nativity and age at immigration as a useful lens to obtain a broader portrait of this population. Although numerous studies in this body of literature document overall health for Latino groups by nativity, less scholarship to date has focused on comparing foreign-born subgroups by age of migration. This omission is

important because men and women tend to migrate for different purposes (i.e. family vs. employment) and experience migration in unique ways (Donato, 2010). Thus, this research addresses an important gap in our understanding of the long-term consequences of stage at immigration in the life course and disability status.

Conceptual Framework

From a life course perspective I test the "healthy immigrant effect," specific to age of migration, among foreign-born Mexican elderly individuals. I argue that the life experiences of the foreign-born in the U.S. are likely to be shaped by the age at which they immigrated to the U.S. Age of migration can be useful for understanding health disparities in older age by approximating type of migration and the degree of selectivity among Mexican immigrants (Gubernskaya 2014). Health selection likely varies by gender and different age groups. A life course perspective describes a dynamic process emphasizing that health disparities are associated with various dimensions of the social structure, including gender, race/ethnicity, age, education, socioeconomic differences, childhood experiences and family background, and such development interacts with the social environment to create trajectories of well-being in later life (Alwin and Wray, 2005; Crosnoe and Elder, 2004). Using this conceptual framework, I seek to examine how the migration experience to the United States shapes the life course of individuals, the health process, and the quality of life in among elderly foreign-born Mexicans.

The life experiences of the Mexican elderly are likely shaped by where they are born and, for the foreign-born, when they immigrated to the U.S. Substantive explanations for the healthy immigrant effect point to health selection mechanisms. The age of an immigrant's arrival in the U.S. appears to be significant (Teruya and Bazargan-Hejaz, 2013). For example, migrant health selectivity is thought to be strongest among

labor migrants who generally migrate in mid life (20-49) in search of employment opportunities in physically demanding industries such as agriculture and construction (Angel et al., 2010; Gubernskaya et al., 2013; Jasso et al., 2004). In contrast, health selectivity is more likely to be weaker among Mexicans who migrated to the U.S. in early life (1-19) as children or adolescents since their migration reflects their parents' characteristics and they do not necessarily have to meet the demands required for migration by themselves (Angel et al., 2010; Breslau et al., 2009; Colon-Lopez et al., 2008; Gubernskaya, 2014). Likewise, health selectivity among late life migrants (50+) may be weaker as older Mexican migrants are more likely to migrate for family reunification reasons rather than to seek employment (Angel et al., 2010; Jasso et al., 2004; Terrazas, 2009; Treas, 2014).

DATA AND METHODS

Data

This research employs data from the Hispanic Established Population for the Epidemiological Study of the Elderly (H-EPESE) to document nativity differentials in disability trajectories among older people of Mexican-origin. The H-EPESE is a large, multi-stage probability sample of older Mexican-Americans who reside in five southwestern states: Arizona, California, Colorado, New Mexico, and Texas (Markides et al., 1997). The H-EPESE has been used extensively to study the prevalence of disability among Mexican-origin adults in the U.S (Peek et al. 2003; Peek, Patel and Ottenbacher 2005). The surveys provide detailed information on health and physical functioning, immigration history, and demographic characteristics for a sample of 3,050 individuals of

Mexican-origin who were first interviewed in 1993-94. This panel was re-contacted in 1995-96, 1998-99, 2000-01, 2004-05, 2007, and 2010-11. Due to attrition in the original cohort, a new cohort of 902 individuals was added in 2004 to increase sample size and statistical power. Proxy respondents are omitted as are those with missing data on covariates. This new panel was re-contacted in 2007 and 2010-11. Individual level data from 1993-2011 is used to construct growth curve trajectories by age across survey years with a mortality linkages through NDI up to Dec. 31, 2011. Respondents ranged in age from 65-107 years.. The final analytic sample includes 4,387 observations for 1,483 men and 6,769 observations for 2,051 women. The average respondent contributes 3.2 waves of data.

Measures

Disability refers to an elderly person's difficultly or inability to perform social roles and self-care tasks which are crucial for independent living (Spector & Fleisman, 1998, Crimmins, 2004). Disability is measured through two separate indicators: one subjective measure Activities of Daily Living (ADLs) and one objective measure performance oriented mobility assessments (POMAs). ADL measurements are commonly used in aging research and are well-documented as reliable scales to assess disability (Smith et al., 1990). To assess ADLs, respondents were asked if they could independently perform the following tasks: walk across a small room, bathe or shower, perform personal grooming (brush hair/teeth), dress, eat, get into or out of a bed, and use a toilet (Katz, Ford, Moskowitz, Jackson, & Jaffe, 1963; Branch, Katz, & Papsidero,

1984). ADL disability was dichotomized as "no help needed" versus "unable to", or "need help to do one or more of the tasks". A positive response was coded as an ADL limitation.

I use the performance-oriented mobility assessment (POMA) to assess functional mobility. The POMA is based on three tasks rated by the interviewer on a 0-4 scale to assess a respondent's ability to sit and stand in chair, walk across the room, and balance while standing (Guralnik, Ferrucci, Simonsick, Salive, & Wallace, 1995). POMA limitations are coded as the number of tasks individuals are unable to perform, so 0 means no limitations, whereas 3 means a respondent is unable to perform any of the tasks. The main variables of interest refer to respondent's nativity and in order to differentiate among the foreign-born, age of migration. To classify nativity, I use birth place information and categorize those respondents born in the U.S. (coded as 1) versus born in Mexico. To measure life course stage at migration, I include three age of immigration groups; those who arrived in childhood (0 – 19 years); middle age (20-49 years); and later life (after age 50). In the analysis with age of migration, individuals born in the US are coded as 0 and serve as the reference group.

Sociodemographic variables used in the analysis include gender, age, education, financial strain, and living arrangements. Gender corresponds to whether the respondent is female or male. Disability trajectories are age-graded using continuous age measure centered at age 65. Educational level is measured as less than high school education. Financial strain is measured with two items, difficulty in meeting monthly bills and how much money do you usually end up with at the end of the month. Respondents reporting

that they have a great deal of difficulty meeting monthly bills or that they do not have enough money to make ends meet at the end of the month were coded as having financial strain. Living arrangements are coded as living with spouse or other family members, compared to living alone.

Health and health behaviors used in the analysis are chronic conditions, ever smoke, and ever drink. This analysis controls for six self-reported items that asked whether the respondent had ever been diagnosed by a doctor or medical personnel with one of the following six medical conditions: (a) a heart attack, or coronary, or myocardial infraction, or coronary thrombosis; (b) a stroke, a blood clot in the brain, or a brain hemorrhage; (c) cancer, or a malignant tumor of any type; (d) high blood pressure; (e) arthritis or rheumatism; or (f) diabetes, sugar in your urine, or high blood sugar. The original response categories for each item were: yes, no, or suspect/possible. Response categories for each items were coded 1 for "yes" and "suspect/possible" and 0 for "no." Previous research (Katz et al., 1996; Simpson et al., 2004; Skinner et al., 2005) has shown self-reported medical conditions by older adults to be reliable with medical records and physician reports. These six medical conditions are specifically used since each condition has potential to influence physical function and disability (Markides et al. 1996; Patel, Peek, Wong & Markides, 2006). Ever smoke, is coded as 1 if respondent ever reports having smoked in the past or that they currently smoke. Ever drink, is coded as 1 if respondent reports ever having been an alcohol drinker.

Statistical Analysis

I employ age-based linear growth curve models to estimate and predict ADL and POMA disability trajectories over the 17 year study period (Singer and Willet, 2003). In this analysis I estimate individual deviations from mean trajectory by nativity and for the foreign-born, by age of migration. The growth curve models assume linear individual trajectories that are based on estimates of person-specific intercepts and slopes or rate of change, that describe patterns of change in disabilities as a function of age (Raudenbush and Bryk, 2002). Age is centered at age 65, so that the intercept represents the mean response for 65 year olds at baseline. All analyses were conducted in Stata 13 and use the appropriate survey weights to ensure the results are representative and account for attrition.

Results

Table 4.1 presents estimates of the effects of key substantive predictors on subjective and objective disability trajectories for Mexican elders 65 years and older stratified by gender. The results show no nativity differences in subjective ADL disability at age 65 or on change in ADL by age. No immigrant health advantage is evident in ADL disability for either male or female foreign-born immigrants. The results in Panel A and Panel B (Models 1 and 2) indicate that ADLs are not significantly different by nativity at age 65, nor is there evidence that nativity affects the rate of change in ADL. However, significant nativity differences emerge in objective disability measured by POMA limitations. In Model 3, U.S.-born Mexican men have higher levels of POMA disability at age 65 relative to their foreign-born counterparts, although they also experience a slower increase in POMA limitations over time. Foreign-born males continue to show a

health advantage in POMA disability once controls for health and health behaviors are added in Model 4. Among women (Panel B), Model 3 indicates no differences by nativity in POMA disability at age 65, though a slower increase with age in POMA limitations can be seen among U.S.-born females. In Model 4 for women, nativity differences in the rate of change in POMA disability remain significantly lower for the U.S.-born once controls for health and health behaviors are added to the model. Foreign-born women exhibit no health advantage relative to their U.S.-born counterparts in POMA disability at baseline, or in rate of change over time. In fact, the results indicate foreign-born women have a steeper rate of decline over time and are at a disadvantage compared to U.S.-born women in objective disability measured by POMA limitations.

Table 4.2 presents disability trajectories by age of migration stratified by gender. (Note in these models U.S.-born elderly are the reference group). Model 1 (Panel A) indicates that foreign-born males who migrated in early life (1-19 years) have fewer ADLs compared to U.S.-born men at age 65, but exhibit no differences in the rate of change in ADLs over time. However, once controls for drinking, smoking, and chronic conditions are included in the analysis, differences by age of migration are no longer significant. Turning to objective POMA limitations, Model 3 indicates that foreign-born males who migrated in mid life (20-49 years) and late life (50 years and older) have significantly fewer POMAs at age 65 than both U.S.-born and foreign-born men who migrated in early life. Interestingly, foreign-born males who migrated in mid life (20-49 years) have steeper increases in POMA limitations compared to the U.S.-born and early life migrants. When controls are added in model 4, age of migration differences remain at

baseline, and significant differences between late life migrants and U.S.-born and early life migrants emerge, such that late life migrants have a steeper increase in POMAs compared to U.S- born and early life migrants. These differences can be clearly seen in Figure 4.1. Mid life and late life migrants start with fewer POMA limitations, but increase swiftly with age, whereas the U.S.-born and early life migrants start with more limitations but experience a slight increase with age. Clearly, an immigrant advantage is evident among mid life and late life migrants at baseline. However, consistent with previous research the health of immigrants converges to native levels over time and with length of residence in the U.S.

Comparing age at migration differences among women (Panel B) Model 1 and Model 2, no significant differences by age at migration are found for ADL disability. Models 3 and 4 estimate models using objective POMA measures, the results show that mid life (20-49 years) migrants have significantly fewer POMA limitations compared to the U.S.-born women. However, they experience a significantly faster increase in POMA disability compared to U.S.-born women and early life immigrant women net of controls for health and health behaviors (see Model 4). The results are illustrated in Figure 4.2, POMA age trajectories are similar for U.S.-born and early life (1-19 years) and late life (50 years and older) immigrant women, however while mid life migrants initially exhibit better health, they experience steeper increases in POMA limitations with age, with the most limitations evident by age 85.

DISCUSSION AND CONCLUSION

The life course perspective permits us to better examine the role of age in the immigration process. This theoretical perspective argues that experiences at early states in the life course impact health and well-being in the later of life. The data presented provide evidence of how the life experiences of Mexican elderly were shaped by nativity, and for immigrants, age at immigration to the U.S. What might account for these differences? I postulate that there are historical and social mechanisms at play that shape the disability status of Mexican elderly. The intersection between socialization and U.S. policies related to economic shifts illustrate how social and contextual conditions have shaped the lived experiences of the Mexican elderly. For example, U.S.-born elderly and early life migrants were largely socialized during the same era, so they faced somewhat similar social, political, and economic opportunities. This means that their experiences and opportunities were shaped by the Great Depression and immigration policies of the time that mostly relegated them to injury-promoting occupations (e.g., mining, farming, railroad construction, etc.) with higher risk of exposure to toxic materials and unsafe equipment. Indeed, each age of migration group considered in this analysis is marked by its own particularities that have clear implications for disability status.

These results indicate significant differences in the health trajectories of the foreign-born after age 65 compared to the U.S.-born, resulting in much steeper health declines for objective disability measured by POMA limitations. However, virtually no differences by nativity are evidence in subjectively measured ADLs. For POMAs, differences by age of migration are largely as expected; migrants who migrated in mid life (20-49), who most likely had more difficulty assimilating and worked in physically

taxing occupations, display steeper health declines compared to their U.S.-born peers. Whereas, migrants who arrived in early life (1-19), are most similar to the U.S.- born in their health trajectories, which may be attributed to their ability to more easily assimilate into mainstream society by arriving at younger ages, along with the opportunity to work in less physically demanding occupations. For the smallest age of migration group, those who arrived at older ages (50 years and older), the men also experience large late life declines in POMAs, which may reflect the physically demanding occupations worked while still living in Mexico.

Nonetheless, I acknowledge that the observed patterns in functional disability at 65 among the foreign-born may largely reflect the health selectivity of migration among working-age males (Palloni and Arias 2004; Palloni and Morenoff 2001). As such, U.S.-born and early life immigrant males tend to have the highest rates of disability compared to foreign-born individuals who came to the United States during late life or of working age. Thus, the lower prevalence of disability among the latter may be attributed to members of these groups being positively selected from the Mexico population on the basis of health giving support to the healthy immigrant effect among mid life and late life male immigrants.. Similarly, because Mexican men have been more likely to migrate to the United States for work-related reasons compared to women, we would expect to see less dramatic differences in levels of functional disability among women compared to men for different age of migration groups. This pattern is observed in the above analysis. The life experiences and health status of the Mexican elderly are greatly shaped by nativity status and, for the foreign-born, age in which they immigrated to the United

States. The goal of this chapter was to examine the heterogeneity within the Mexican-origin elderly population by nativity and, for the foreign-born by age of migration to assess whether the healthy immigrant effect in mortality extend to disability trajectories among foreign-born Mexican subgroups residing in the southwestern United States. I examine the extent to which age of migration affects disability status for this group as a way to contribute to discussions of the "healthy immigrant effect." The results show that while the majority of elderly Mexicans are U.S.-born, nativity status, as measured by age of immigration, is crucial to our understanding of disability status. In general, foreign-born immigrants, have similar or lower disability rates than the U.S.-born. These results contribute to extant efforts that have attempted to unravel the epidemiological paradox. In particular, this analysis contributes to ongoing discussions related to the degree to which Mexican elderly immigrants exhibit positive or negative outcomes based on immigration status and time in the U.S.

Table 1: Nativity Trajectories of ADL and POMA Disabilities Among Adults 65 and Older: Linear Growth Curve Models by Gender

	Panel A: Men (N=4,387 observations)								Panel B: Women (N=6,780 observations)							
	ADL				POMA				ADL				POMA			
Intercept (At Age 65)	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
US born	0.13	(0.10)	0.07	(0.10)	0.35***	(0.08)	0.32***	(0.07)	0.04	(0.07)	0.03	(0.07)	0.12	(0.07)	0.11	(0.06)
Age	0.05***	(0.01)	0.03	(0.02)	0.05***	(0.01)	0.02	(0.01)	0.05***	(0.01)	0.03*	(0.01)	0.05***	(0.01)	0.03**	(0.01)
Financial Strain	0.17*	(0.08)	0.19*	(0.08)	0.20**	(0.07)	0.20**	(0.07)	-0.06	(0.07)	-0.07	(0.07)	0.02	(0.06)	0.03	(0.06)
Less HS	-0.01	(0.16)	0.05	(0.15)	0.13	(0.11)	0.16	(0.11)	-0.28**	(0.10)	-0.27**	(0.10)	0.09	(0.10)	0.06	(0.10)
Ever Smoke			-0.22*	(0.11)			-0.31***	(0.08)			0.06	(0.07)			-0.10	(0.07)
Ever Drink			-0.02	(0.12)			-0.37***	(0.09)			0.07	(0.08)			-0.16*	(0.07)
Lives Alone			-0.19	(0.12)			-0.10	(0.09)			-0.03	(0.07)			-0.17**	(0.06)
Chronic Conditions																
Cardio			0.41**	(0.13)			-0.10	(0.11)			0.29*	(0.12)			0.41***	(0.10)
Stroke			0.44**	(0.16)			0.31*	(0.13)			0.55**	(0.18)			-0.00	(0.14)
Hypertension			0.06	(0.08)			-0.06	(0.07)			-0.01	(0.07)			-0.01	(0.06)
Cancer			0.07	(0.17)			0.19	(0.13)			0.01	(0.11)			-0.06	(0.10)
Diabetes			0.28**	(0.10)			0.25***	(0.08)			0.06	(0.07)			0.15*	(0.07)
Arthritis			-0.26**	(0.08)			0.03	(0.07)			-0.02	(0.07)			0.00	(0.06)
Constant	-0.21	(0.17)	-0.07	(0.19)	-0.04	(0.12)	0.42**	(0.14)	0.03	(0.11)	-0.00	(0.12)	0.31**	(0.11)	0.41***	(0.12)
Linear Slope																
US born	-0.00	(0.01)	-0.00	(0.01)	-0.02**	(0.01)	-0.02**	(0.01)	-0.01	(0.01)	-0.01	(0.01)	-0.01*	(0.00)	-0.01*	(0.00)
Financial Strain	0.00	(0.01)	0.00	(0.01)	0.01	(0.01)	0.01	(0.01)	0.02***	(0.01)	0.02***	(0.01)	0.01**	(0.00)	0.01*	(0.00)
Less HS	0.00	(0.01)	0.00	(0.01)	0.00	(0.01)	0.00	(0.01)	0.03**	(0.01)	0.03**	(0.01)	0.01	(0.01)	0.01	(0.01)
Ever Smoke			0.01	(0.01)			0.01	(0.01)			0.00	(0.01)			0.01	(0.01)
Ever Drink			-0.01	(0.01)			0.01	(0.01)			-0.01	(0.01)			0.01	(0.01)
Lives Alone			0.01	(0.01)			0.00	(0.01)			-0.00	(0.01)			0.01*	(0.00)
Chronic Conditions																
Cardio			-0.02	(0.01)			0.01	(0.01)			-0.01	(0.01)			-0.01	(0.01)
Stroke			0.02	(0.01)			0.01	(0.01)			-0.01	(0.01)			0.01	(0.01)
Hypertension			0.00	(0.01)			0.01	(0.01)			0.01	(0.01)			0.00	(0.00)
Cancer			0.00	(0.01)			-0.01	(0.01)			0.00	(0.01)			0.01	(0.01)
Diabetes			-0.00	(0.01)			0.00	(0.01)			0.02***	(0.01)			0.01	(0.00)
Arthritis			0.03***	(0.01)			0.01	(0.00)			0.01**	(0.01)			0.01**	(0.00)

Notes: Standard errors in parentheses. *p<.05 **p<.01 ***p<.001

Table 2: Age at Migration Trajectories of ADL and POMA Disabilities Among Adults 65 and Older: Linear Growth Curve Models by Gender

	Panel A: Men (N=4,387)								Panel B: Women (N=6,780)							
	ADL				POMA				ADL				POMA			
Intercept (Age=65)	Model 1		Model 2		Model 3		Model 4		Model 1		Model 2		Model 3		Model 4	
Age at Migration (Ref=US born)																
0-19	-0.36*	(0.18)	-0.28	(0.17)	-0.04	(0.14)	-0.01	(0.13)	-0.05	(0.13)	-0.01	(0.13)	-0.00	(0.12)	0.02	(0.12)
20-49	-0.14	(0.12)	-0.06	(0.11)	-0.45***[a]	(0.09)	-0.41***[a]	(0.09)	0.02	(0.08)	0.01	(0.08)	-0.20*	(0.08)	-0.20**	(0.08)
50+	-0.04	(0.19)	-0.09	(0.18)	-0.44**[a]	(0.14)	-0.49***[a]	(0.14)	-0.21	(0.12)	-0.15	(0.12)	-0.05	(0.12)	-0.03	(0.12)
Age	0.04***	(0.01)	0.03*	(0.01)	0.04***	(0.01)	0.01	(0.01)	0.04***	(0.01)	0.02*	(0.01)	0.03***	(0.01)	0.01	(0.01)
Financial Strain	0.15	(0.08)	0.18*	(0.08)	0.19**	(0.07)	0.20**	(0.07)	-0.05	(0.07)	-0.06	(0.07)	0.03	(0.06)	0.04	(0.06)
Less than HS	-0.03	(0.15)	0.03	(0.14)	0.15	(0.11)	0.17	(0.11)	-0.27**	(0.10)	-0.26*	(0.10)	0.09	(0.10)	0.06	(0.10)
Ever Smoke			-0.20	(0.11)			-0.28***	(0.09)			0.07	(0.07)			-0.09	(0.07)
Ever Drink			0.04	(0.11)			-0.37***	(0.09)			0.07	(0.08)			-0.15*	(0.07)
Lives Alone			-0.17	(0.12)			-0.12	(0.09)			-0.03	(0.07)			-0.17**	(0.06)
Chronic Conditions																
Cardio			0.35**	(0.13)			-0.13	(0.11)			0.32*	(0.12)			0.40***	(0.10)
Stroke			0.33*	(0.16)			0.26*	(0.13)			0.55**	(0.18)			-0.01	(0.14)
Hypertension			0.04	(0.08)			-0.06	(0.07)			-0.01	(0.07)			-0.02	(0.06)
Cancer			0.08	(0.16)			0.20	(0.13)			0.00	(0.11)			-0.07	(0.10)
Diabetes			0.27**	(0.10)			0.27***	(0.08)			0.05	(0.07)			0.15*	(0.07)
Arthritis			-0.24**	(0.08)			0.02	(0.07)			-0.01	(0.07)			-0.01	(0.06)
Constant	-0.05	(0.14)	-0.02	(0.17)	0.30**	(0.11)	0.73***	(0.13)	0.06	(0.10)	0.00	(0.11)	0.43***	(0.10)	0.53***	(0.11)
Linear Slope																
Age at Migration(Ref=US born)																
0-19	0.02	(0.01)	0.01	(0.01)	-0.00	(0.01)	-0.01	(0.01)	0.00	(0.01)	0.00	(0.01)	0.00	(0.01)	0.00	(0.01)
20-49	0.01	(0.01)	0.00	(0.01)	0.03***[a]	(0.01)	0.02***[a]	(0.01)	0.00	(0.01)	0.00	(0.01)	0.02***	(0.01)	0.02***[a]	(0.01)
50+	-0.01	(0.01)	-0.01	(0.01)	0.02	(0.01)	0.02*[a]	(0.01)	0.02	(0.01)	0.02	(0.01)	0.00	(0.01)	0.00	(0.01)
Financial Strain	0.00	(0.01)	0.00	(0.01)	0.01	(0.01)	0.01	(0.01)	0.02***	(0.01)	0.02***	(0.01)	0.01**	(0.00)	0.01*	(0.00)
Less than HS	0.00	(0.01)	0.01	(0.01)	0.00	(0.01)	0.00	(0.01)	0.03**	(0.01)	0.03**	(0.01)	0.01	(0.01)	0.01	(0.01)
Ever Smoke			0.01	(0.01)			0.01	(0.01)			0.00	(0.01)			0.01	(0.01)
Ever Drink			-0.01	(0.01)			0.01	(0.01)			-0.01	(0.01)			0.01	(0.01)
Lives Alone			0.01	(0.01)			0.01	(0.01)			-0.00	(0.01)			0.01*	(0.00)
Chronic Conditions																
Cardio			-0.01	(0.01)			0.01	(0.01)			-0.02*	(0.01)			-0.01	(0.01)
Stroke			0.02	(0.01)			0.01	(0.01)			-0.02	(0.01)			0.01	(0.01)
Hypertension			0.00	(0.01)			0.00	(0.01)			0.01	(0.01)			0.00	(0.00)
Cancer			0.00	(0.01)			-0.01	(0.01)			0.00	(0.01)			0.01	(0.01)
Diabetes			-0.00	(0.01)			0.00	(0.01)			0.03***	(0.01)			0.01	(0.00)
Arthritis			0.03***	(0.01)			0.01*	(0.00)			0.01*	(0.01)			0.01**	(0.00)

Notes: T-Tests were used to evaluate significant differences between age at migration groups. A indicates that those migrating at ages 20-49 or 50+ are significantly different from those who migrated at ages 0-19. Standard errors in parentheses. *p<.05 **p<.01 ***p<.001

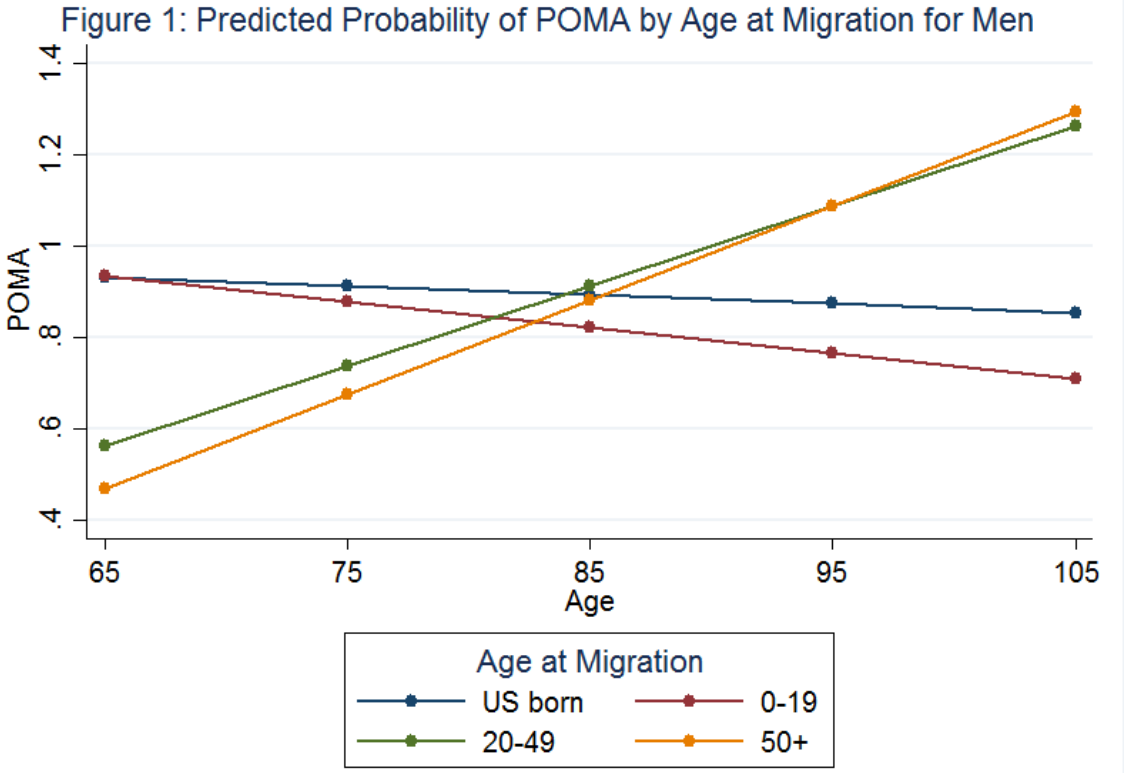
Figure 1: Predicted Probability of POMA by Age at Migration for Men
POMA
.4
.6
.8
1
1.2
1.4
65
75
85
95
105
Age
Age at Migration
US born
0-19
20-49
50+

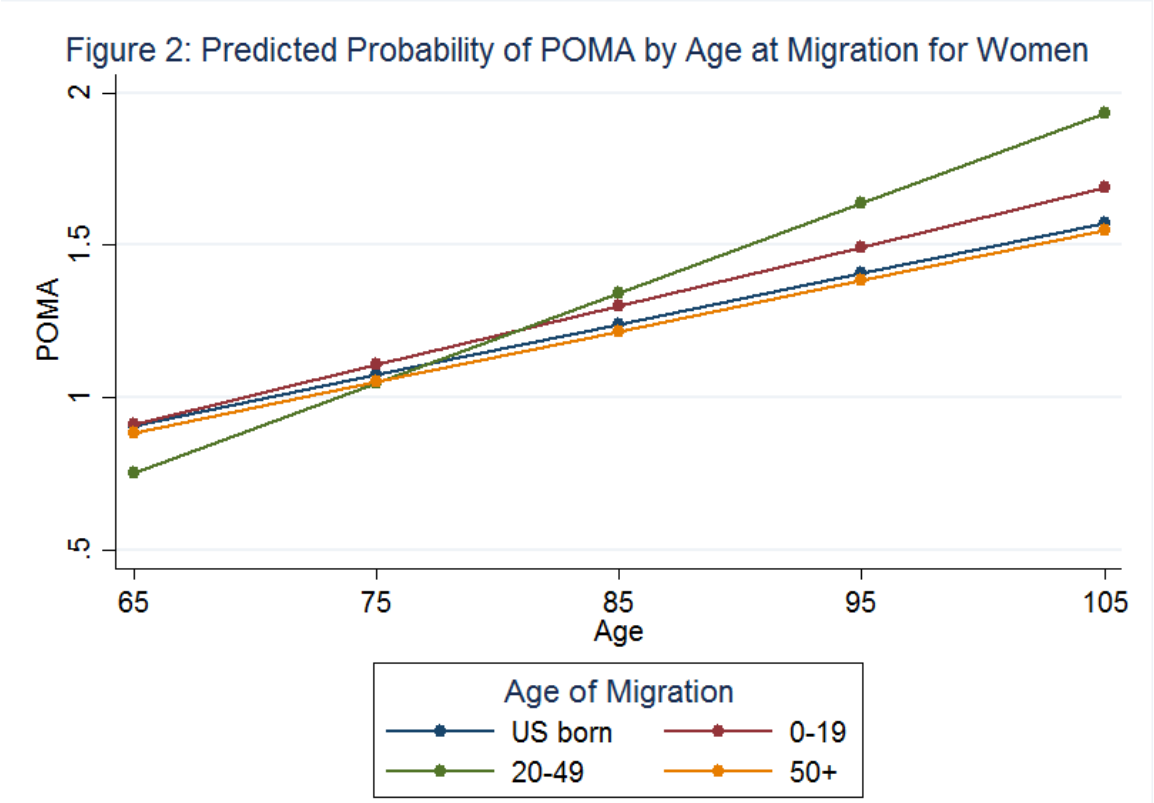
Figure 2: Predicted Probability of POMA by Age at Migration for Women
POMA
.5
1
1.5
2
65
75
85
95
105
Age
Age of Migration
US born
0-19
20-49
50+

Chapter 5: Conclusion

KEY FINDINGS AND CONTRIBUTIONS

The Latino population of the United States has experienced unprecedented growth in the past several decades, surpassing African Americans as the nation's largest minority group. In 2012, 3.1 million (5.8 percent) of those over 65 were Latinos, and their number is projected to increase to over 15.4 million by 2050 (U.S. Census Bureau, 2014). Mexicans Americans are by far the largest Latino-origin subgroup in the U.S., accounting for nearly two-thirds of the total Latino population. A record 33.7 million Latinos of Mexican-origin, including 11.4 million immigrants born in Mexico, resided in the United States in 2012 (Gonzalez-Barrera and Lopez 2013). These demographic trends suggest that health status of Latinos, both foreign and U.S.-born, will play an increasingly central role in shaping and understanding health outcomes and policy in the U.S. These trends and projections underscore the need for additional focus on the health of both foreign-born and U.S-born elderly Latinos, particularly those of Mexican-descent. In particular, it will be important to better understand how nativity and the migration patterns of aging Latinos influence the morbidity, disability, physical functioning, and mortality patterns of this growing population.

This dissertation builds on prior research and fills gaps in current scholarship in several important ways. First, most related studies focus on only a few Latino sub-groups when examining morbidity, disability, physical functioning, and active life expectancy. In contrast, my dissertation examines morbidity, Activities of Daily Living (ADLs), Instrumental Activities of Daily Living (IADLs), and Performance-Oriented Mobility Assessment (POMA) to assess chronic conditions and functional limitations across eight groups by gender, nativity and age of migration among Mexican-origin elderly individuals residing in the southwestern United States. This broad examination takes into

account the demographic heterogeneity of the U.S. Mexican-origin population and is especially timely given the rapid population aging that U.S. Latino and immigration subpopulations are experiencing. Second, in contrast to past research that relies almost exclusively on nativity to assess immigrant-native differences in health and well-being among Latinos, I use expanded immigrant categories to better assess the heterogeneity among foreign-born Mexican-origin elderly individuals. Third, I examine how age of migration confounds nativity disparities in active life expectancy by better specifying foreign-born immigrant subgroups. These analyses move beyond the description of nativity differences by dividing immigrants into three life course stages of migration to help gain a better understanding of why such immigrant-native differences exist. This is particularly important given the rapid growth and aging of the Mexican-origin population in the United States.

In this concluding chapter I summarize the findings of each of my three empirical analyses and discuss the significance of these findings and how they contribute to the larger overall scholarship on sociodemographic differentials in disability for older Latino adults. The first empirical chapter documented nativity and, for immigrants, age of migration disparities in the prevalence of morbidity, disability and physical functioning in the United States, specific to age group. I distinguish among foreign-born and U.S.-born Mexican elderly, and for the foreign-born, by age of migration. I use aggregated individual level data from the Hispanic Established Population for the Epidemiologic Study of the Elderly (H-EPESE) spanning 1993 to 2011 in order to make these comparisons. My findings are consistent with the healthy immigrant hypothesis for both male and female foreign-born sub-groups in late-life. Specifically, the results show that U.S.-born and foreign-born Mexican Americans, with a few exceptions, have similar prevalence rates for morbidity regardless of gender, and for immigrants, age of migration.

In addition, consistent with the literature these findings also point to the significantly higher rates of IADL disability for foreign-born women in later life, particularly for those who arrived in the U.S. after the age of 50. While all foreign-born women are disadvantaged relative to U.S.-born women, midlife migrants appear more health select in terms of any IADL disability, followed by early life immigrants.

Conversely, foreign-born males appear to have rates of ADL and IADL disability that are similar to U.S.-born males. However, there is a degree of health selectivity in functional limitations measured by POMA disability in the younger age category (65-74 years), particularly for midlife male migrants. Interestingly, migration selectivity is stronger for late life immigrants than early immigrants. Overall, the results find nativity and age of migration to be an important predictor of IADL disability for foreign-born females, and ADL disability for native-born males. Similarly, the results provide a historical foundation for the existing age of migration literature. These findings also validate the limitations of previous research by illustrating that Mexican immigrants are not a homogeneous group and that migrant health selectivity depends on when and at what age they arrived in the United States.

This study represents one of the first detailed and comprehensive analyses of multiple indicators of morbidity and disability across a broad range of nativity and age of migration groups and thus provided critical insight into immigration patterns of morbidity and disability in late life for immigrant sub-groups.

The second empirical chapter used seven waves of data from the HEPESE to both assess and further explain nativity and age of migration disparities in active life expectancy using measures of Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs) for Mexican-origin adults aged 65 and older. The results are consistent with previous findings that foreign-born individuals residing in the

United States have lower mortality and are more select on health than their U.S.-born counterparts. As other studies increasingly show, the healthy immigrant effect does not appear to apply to disability, with the exception of ADL disability among immigrant males The findings provide evidence of how the life experiences of Mexican elderly were shaped by nativity and for immigrants, age at immigration to the U.S. Foreign-born women in particular spend a larger fraction of their later years with both ADL and IADL disability than U.S.-born women and there are important differences by age of migration. While foreign-born Mexican elderly live longer, they are more likely doing so in a disabled state.

The third empirical chapter also uses HEPESE data and draws on a life course framework to assess nativity and age of migration differentials in disability trajectories among Mexican-origin elders.The results indicate significant differences in the health trajectories of the foreign-born after age 65 relative to their U.S.-born peers, resulting in much steeper health declines for objective disability measured by POMA limitations. Conversely, no differences by nativity and for immigrants, age of migration are evident in subjective disability measured by ADLs. For functional limitations, differences by age of migration are largely as expected; mid life migrants, who most likely worked in physically taxing occupations, display steeper health declines compared to their U.S.-born peers. Whereas, early life migrants mostly resemble the U.S.- born in their health trajectories. Late life migrant (50 years and older) men also experience large late life declines in POMAs, which may reflect the physically demanding occupations worked while still living in Mexico. These findings illustrate the importance of research into additional factors, such as physically taxing and disabling employment conditions, that set the stage for higher disability rates for Mexicans who migrate to the United States as adults to pursue employment or reunite with family.

References

Acevedo-Garcia, D., & Bates, L. M. (2008). Latino health paradoxes: Empirical evidence, explanations, future research, and implications. In H. Rodriguez, R. Saenz, & C. Menjivar (Eds.), Latinas/os in the United States: Changing the Face of America (pp. 101–113). New York: Springer US.

Akresh, Ilana Redstone. 2007. "Dietary Assimilation and Health among Hispanic Immigrants to the United States." *Journal of Health and Social Behavior* 48(4):404-17.

Al Snih, S., J. E. Graham, L. A. Ray, R. Samper-Ternent, K. S. Markides, and K. J. Ottenbacher. 2009. "Frailty and Incidence of Activities of Daily Living Disability among Older Mexican Americans." *Journal of Rehabilitation Medicine* 41(11):892-97.

Angel, Jacqueline L., and Ronald J. Angel. 1992. "Age at Migration, Social Connections, and Well-Being among Elderly Hispanics." *Journal of aging and health* 4(4):480-99.

—. 2006. "Minority Group Status and Healthful Aging: Social Structure Still Matters." *American Journal of Public Health* 96(7):1152-59.

Angel, R., Angel, J., & Markides, K. (2003). Salud física de los mexicanos migrantes mayores en los Estados Unidos. In N. Salgado & R. Wong (Eds.), *Envejeciendo en la pobreza. Género, salud y calidad de vida* [Growing old in poverty. Gender,health and quality of life] (pp. 152-172). Mexico City, Mexico: INSP.

Angel, Ronald J., Jacqueline L. Angel, Carlos Díaz Venegas, and Claude Bonazzo. 2010. "Shorter Stay, Longer Life: Age at Migration and Mortality Among the Older Mexican-Origin Population." *Journal of aging and health* 22(7):914-31.

Angel, Ronald J., Jacqueline L. Angel, and Terrence D. Hill. 2015. "Longer lives, sicker lives? Increased longevity and extended disability among mexican-origin elders." *The journals of gerontology. Series B, Psychological sciences and social sciences* 70(4):639-49.

Angel, Ronald J., Jacqueline L. Angel, Geum-Yong Lee, and Kyriakos S. Markides. 1999. "Age at migration and family dependency among older Mexican immigrants: Recent evidence from the Mexican American EPESE." *The Gerontologist* 39(1):59-65.

Antecol, H., & Bedard, K. (2006). Unhealthy assimilation: Why do immigrants converge

to American health status levels? *Demography, 43*, 337-360.

Arias, E. (2010). *United States Life Tables by Hispanic Origin*. National Center for Health Statistics.

Borjas, George J. 2011. "Social security eligibility and the labor supply of older immigrants." *Industrial & labor relations review* 64(3):485-501.

Branch, L. G., S. Katz, K. Kniepmann, and J. A. Papsidero. 1984. "A Prospective-Study of Functional Status among Community Elders." *American Journal of Public Health* 74(3):266-68.

Caskie, G. I. L., M. C. Sutton, and J. A. Margrett. 2010. "The Relation of Hypertension to Changes in ADL/IADL Limitations of Mexican American Older Adults." *Journals of Gerontology Series B-Psychological Sciences and Social Sciences* 65(3):296-305.

Cantu, P. A., M. D. Hayward, R. A. Hummer, and C. T. Chiu. 2013. "New estimates of racial/ethnic differences in life expectancy with chronic morbidity and functional loss: evidence from the National Health Interview Survey." *Journal of cross-cultural gerontology* 28(3):283-97.

Chiquiar, Daniel, and Gordon H. Hanson. 2005. "International migration, self-selection, and the distribution of wages: evidence from Mexico and the United States." *Journal of Political Economy* 113(2):239-81.

Choi, Sunha H. 2012. "Testing Healthy Immigrant Effects Among Late Life Immigrants in the United States: Using Multiple Indicators." *Journal of aging and health* 24(3):475-506.

Colón-López, Vivian, Mary N. Haan, Allison E. Aiello, and Debashis Ghosh. 2009. "The Effect of Age at Migration on Cardiovascular Mortality Among Elderly Mexican Immigrants." *Annals of Epidemiology* 19(1):8-14.

Coward, R.T., C.W. Peek, J.C. Henretta, R.P. Duncan, M.C. Dougherty, and G.H. Gilbert. 1997. “Race Differences in the Health of Elders Who Live Alone.” *Journal of Aging & Health* 9:147-170.

Crimmins, E. M., & Beltrán-Sánchez, H. (2011). Mortality and Morbidity Trends: Is There Compression of Morbdiity? *Journal of Gerontology: Social Sciences, 66B*, 75-86.

Crimmins, E. M., & Saito, Y. (2001). Trends in Healht and Life Expectancy in teh United States: 1970-1990: Gender, Race and Educational Differences. *Social Science and Medicine, 52*, 1629-1641.

Crimmins, E. M., Saito, Y., & L.Reynolds, S. (1997). Further Evidence on Recent Trends in the Prevalence and Incidence of Disability among Older Americans from Two Sources: the LSOA and the NHIS. *Jouranls of Gerontology, 52*(2), S59-71.

Dannefer, Dale. 2003. "Cumulative advantage/disadvantage and the life course: cross-fertilizing age and social science theory." *The journals of gerontology. Series B, Psychological sciences and social sciences* 58(6):S327-37.

Elder, Glen H., Monica Kirkpatrick Johnson, and Robert Crosnoe. 2003. "The Emergence andDevelopment of Life Course Theory." Pp. 3-19 in Handbook of the Life Course, edited by Jeylan T. Mortimer and Michael J.Shanahan: Springer US

Derose, Kathryn Pitkin, Jose J. Escarce, and Nicole Lurie. 2007. "Immigrants And Health Care: Sources Of Vulnerability." *Health Affairs* 26(5):1258-68.

Fenelon, Andrew. 2013. "Revisiting the Hispanic Paradox in the United States: the role of smoking." *Social science & medicine (1982)* 82(Journal Article):1-9.

Goldman, Noreen, Anne R. Pebley, Mathew J. Creighton, Graciela M. Teruel, Luis N. Rubalcava, and Chang Chung. 2014. "The Consequences of Migration to the United States for Short-Term Changes in the Health of Mexican Immigrants." *Demography* 51(4):1159-73.

Gorin, S. H., & Lewis, B. (2004). The Compression of Morbidity: Implications for Social Work. *Health and Social Work, 29*(3), 249-254.

Gonzalez, H. M., M. Ceballos, W. Tarraf, B. T. West, M. E. Bowen, and W. A. Vega. 2009. "The Health of Older Mexican Americans in the Long Run." *American Journal of Public Health* 99(10):1879-85.

Guralnik, J. M., LaCroix, A. Z., Branch, L. G., Kasl, S. V., & Wallace, R. B. (2001). Morbidity and disability in older persons in the years prior to death. *American Journal of Public Health, 81*(4), 443–447.

Hao, Lingxin, and Julie J. H. Kim. 2009. "Immigration and the American Obesity Epidemic." *International Migration Review* 43(2):237-62.

Hays, J.C. and L.K. George. 2002. "The Life Course Trajectory Toward Living Alone: Racial Differences." *Research on Aging* 24:283-307.

Hayward, M.D. Warner D.F., & Crimmins, E.M. (2007.). Does longer life mean better health? Not for native-born Mexican Americans in the Health and Retirement Study. In J. L. Angel & K. E. Whitfield (Eds.), *The Health of Aging Hispanics* (pp. 86-95). New York, NY: Springer New York.

Hayward, M.D., Hummer, R.A., Chiu, C. Gonzales, C., &Wong, R. (2014). "Does the Hispanic Paradox in Mortality Extend to Disability?" *Population Research and Policy Review*. 33, 81-96.

Hill, T., Angel, J., & Balistreri, K. (2012). Does the 'Healthy Immigrant Effect' Extend to Cognitive Aging?" In J. L. Angel, F. Torres-Gil & K. Markides (Eds.), (pp. 19−33). New York: Springer Sciences.

Hill, Terrence D., Jacqueline L. Angel, Kelly S. Balistreri, and Angelica P. Herrera. 2012. "Immigrant status and cognitive functioning in late-life: an examination of gender variations in the healthy immigrant effect." *Social science & medicine (1982)* 75(12):2076-84.

Hummer, A. Robert, and D. Hayward Mark. 2015. "Hispanic Older Adult Health & Longevity in the United States: Current Patterns & Concerns for the Future." *Daedalus* 144(2):20-30.

Jasso, G., Massey, D. M., Rosenzweig, M. R., & Smith, J. P. (2004).

Immigrant health: Selectivity and acculturation. In N. B. Anderson, R. A. Bulatao, & B. Cohen (Eds.), Critical perspectives on racial and ethnic differences in health in late life. Washington, DC: The National Academic Press.

Jagger, Carol, Bianca Cox, Sophie Le Roy, and EHEMU. 2006. "Health Expectancy Calculation by the Sullivan Method." in *EHEMU Technical Report September 2006*.

Jeffrey S. Passel and D'Vera Cohn, A Portrait of Unauthorized Immigrants in the United States (Washington, D.C.: Pew Hispanic Center, 2015)

Kaestner, Robert, Jay A. Pearson, Danya Keene, and Arline T. Geronimus. 2009. "Stress, Allostatic Load, and Health of Mexican Immigrants." *Social Science Quarterly* 90(5):1089-111.

Kandel, William A., and Katharine M. Donato. 2009. "Does Unauthorized Status Reduce Exposure to Pesticides? Evidence From the National Agricultural Workers Survey." *Work and Occupations* 36(4):367-99.

Katz, S., A. B. Ford, R. W. Moskowitz, B. A. Jackson, and M. W. Jaffe. 1963. "Studies of Illness in the Aged - the Index of Adl - a Standardized Measure of Biological and Psychosocial Function." *Jama-Journal of the American Medical Association* 185(12):914-19.

Kimbro, Rachel Tolbert. 2009. "Acculturation in Context: Gender, Age at Migration, Neighborhood Ethnicity, and Health Behaviors." *Social Science Quarterly* 90(5):1145-66.

Kimbro, Rachel Tolbert, Sharon Bzostek, Noreen Goldman, and German Rodriguez. 2008. "Race, Ethnicity, And The Education Gradient In Health." *Health Affairs* 27(2):361-72.

Lara, Marielena, Cristina Gamboa, M. Iya Kahramanian, Leo S. Morales, and David E. Hayes Bautista. 2005. "Acculturation and Latino health in the United States: a review of the literature and its sociopolitical context." *Annual Review of Public Health* 26(1):367-97.

Lariscy, Joseph T., Robert A. Hummer, and Mark D. Hayward. 2015. "Hispanic Older Adult Mortality in the United States: New Estimates and an Assessment of Factors Shaping the Hispanic Paradox." *Demography* 52(1):1-14.

Lariscy, J. T., R. A. Hummer, J. M. Rath, A. C. Villanti, M. D. Hayward, and D. M. Vallone. 2013. "Race/Ethnicity, Nativity, and Tobacco Use Among US Young Adults: Results From a Nationally Representative Survey." *Nicotine & Tobacco Research* 15(8):1417-26.

Lawton, M. P., and E. M. Brody. 1969. "Assessment of Older People - Self-Maintaining and Instrumental Activities of Daily Living." *Gerontologist* 9(3p1):179.

Lopez-Gonzalez, Lorena, Veronica C. Aravena, and Robert A. Hummer. 2005. "Immigrant Acculturation, Gender and Health Behavior: A Research Note." *Social Forces* 84(1):581-93.

Manton, K. G., & Stallard, E. (1991). Cross-sectional Estimates of Active Life Expectancy for th U.S. Elderly and Oldest-Old Populations. *Journal of Gerontology: Social Sciences, 46*, S170-S182.

Manton, K. G., Xiliang, G. X., & Lamb, V. L. (2006). Change in chronic disability from 1982 to 2004/2005 as measured by long-term changes in function and health in the US elderly population. . *Proceedings of the National Academy of Sciences of the United States of America 103(48):18374-18379., 103*(48), 18374-18379.

Markides, K. S., and K. Eschbach. 2005. "Aging, migration, and mortality: Current status of research on the Hispanic paradox." *Journals of Gerontology Series B-Psychological Sciences and Social Sciences* 60:68-75.

Markides, K. S., Eschbach, K., Ray, L. A., & Peek, M. K. (2007). Census Disability Rates Among Older People by Race/Ethnicity and Type of Hispanic Origin. In J. L. Angel & K. E. Whitfield (Eds.), *The Health of Aging Hispanics* (pp. 26-39). New York, NY: Springer New York.

Markides, K. S., L. Rudkin, R. J. Angel, and D. V. Espino. 1997. "Health status of Hispanic elderly." *Racial and Ethnic Differences in the Health of Older Americans*:285-300.

Ostir GV, DiNuzzo T. In: Black, Sandra A, Ray, Laura A, Angel, Ronald J, Espino, David V, Miranda, Manuel & Markides, Kyriakos S (eds.). Resource Book of the Hispanic Established Populations for Epidemiologic Studies of the Elderly. Ann Arbor, MI: National Archive for Computerized Data on Aging, 2003.

Palloni, A. (2007). Health status of elderly Hispanics in the United States. In J. L. Angel & K. E. Whitfield (Eds.), The health of aging Hispanics: The Mexican-origin population (pp. 1-14). New York: Springer.

Palloni, Alberto, and Elizabeth Arias. 2004. "Paradox Lost: Explaining the Hispanic Adult Mortality Advantage." *Demography* 41(3):385-415.

Peek, M. Kristen, Malcolm P. Cutchin, Jennifer J. Salinas, Kristin M. Sheffield, Karl Eschbach, Raymond P. Stowe, and James S. Goodwin. 2010. "Allostatic load among non-Hispanic Whites, non-Hispanic Blacks, and people of Mexican origin: effects of ethnicity, nativity, and acculturation." *American Journal of Public Health* 100(5):940-46.

Piore, Michael J. 1979. *Birds of passage: migrant labor and industrial societies*. Cambridge: Cambridge University Press.

Quiñones, A. R., Liang, J., Bennett, J. M., Xu, X., & Ye, W. (2011). How Does the Trajectory of Multimorbidity Vary Across Black, White, and Mexican Americans in Middle and Old Age? *Journal of Gerontology: Social Sciences, 66B*, 739-749.

Riosmena, Fernando, and Jeff A. Dennis. 2012. "A Tale of Three Paradoxes: The Weak Socioeconomic Gradients in Health a ong Hispanic Immigrants and Their Relation to the Hispanic Health Paradox and Negative Acculturation." Pp. 95-110

in Aging, Health,and Longevity in the Mexican-Origin Population, edited by Jacqueline L. Angel, Fernando Torres-Gil, and Kyriakos Markides: Springer US.

Riosmena, F., R. Wong, and A. Palloni. 2013. "Migration selection, protection, and acculturation in health: a binational perspective on older adults." *Demography* 50(3):1039-64.

Rubio, M., and R. Saenz. 2007. "Disability among elderly Mexicans in the United States: The case of the 0.25 generation and beyond." *American journal of epidemiology* 165(11):S86-S86.

Rubalcava, Luis N., Graciela M. Teruel, Duncan Thomas, and Noreen Goldman. 2008. "The Healthy Migrant Effect: New Findings From the Mexican Family Life Survey." *American Journal of Public Health* 98(1):78-84.

Rumbaut, Rubén G. 2004. "Ages, Life Stages, and Generational Cohorts: Decomposing the Immigrant First and Second Generations in the United States." *International Migration Review* 38(3):1160-205.

Rumbaut, R. G. 1997. "Paradoxes (and orthodoxies) of assimilation." *Sociological Perspectives* 40(3):483-511.

Saenz, Rogelio. 2004. "Latinos and the Changing Face of America." New York and Washington, DC: Russell Sage Foundation and Population Reference Bureau.

Singh, G. K., and R. A. Hiatt. 2006. "Trends and disparities in socioeconomic and behavioural characteristics, life expectancy, and cause-specific mortality of native-born and foreign-born populations in the United States, 1979-2003." *International journal of epidemiology* 35(4):903-19.

Spector, W. D., and J. A. Fleishman. 1998. "Combining activities of daily living with instrumental activities of daily living to measure functional disability." *The journals of gerontology. Series B, Psychological sciences and social sciences* 53(1):S46-57.

Sullivan, D. F. 1971. "A Single Index of Mortality and Morbidity." *HSMHA Health Reports* 86(4):347-54.

Teachman, J.D.and M.D. Hayward. 1993. "Interpreting Hazard Rate Models." *Sociological Methods & Research* 21(3):340-371.

Telles, Edward E., and Vilma Ortiz. 2007. *Generations of Exclusion: Mexican Americans, Assimilation, and Race*. New York: Russell Sage Foundation. Teruya,

Stacey A., and Shahrzad Bazargan-Hejazi. 2013. "The Immigrant and Hispanic Paradoxes: A Systematic Review of Their Predictions and Effects." *Hispanic Journal of Behavioral Sciences* 35(4):486-509.

Terrazas, A. (2009). Older immigrants in the United States. Washington, DC: Migration Policy Institute.

Treas, Judith. 2015. "Incorporating immigrants: integrating theoretical frameworks of adaptation." *The journals of gerontology. Series B, Psychological sciences and social sciences* 70(2):269-78.

Treas, Judith, and Shampa Mazumbdar. 2002. "Older People in America's Immigrant Families: Dilemmas of Dependence, Integration, and Isolation." *Journal of Aging Studies* 16(3):243-58.

Turra, Cassio M., and Noreen Goldman. 2007. "Socioeconomic Differences in Mortality Among U.S. Adults: Insights Into the Hispanic Paradox." *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences* 62(3):S184-S92.

U.S. Census Bureau. 2010. The Next Four Decades The Older Population in the United States: 2010 to 2050. Washington, DC: U.S. Census Bureau.

U.S. Census Bureau. 2011. The Older Population: 2010. Washington, DC: U.S. Census Bureau.

U.S. Census Bureau. 2014. 65+ in the United States: 2010. Washington, DC: U.S. Census Bureau

Wakabayashi, Chizuko. 2010. "Effects of Immigration and Age on Health of Older People in the United States." *Journal of Applied Gerontology* 29(6):697-719.

Zeki, A. A.-H., Odden, M., Mayeda, E. R., Aiello, A. E., Neuhaus, J. M., & Haan, M. N. (2012). Lifetime Socioeconomic Position and Functional Decline in Older Mexican Americans: Results from the Sacramento Area Latino Study on Aging. In J. L. Angel, F. Torres-Gil & K. S. Markides (Eds.), *Aging, Healht and Longevity in the Mexican-origin Population* (pp. 35-49). New York, NY: Springer Sciences.

Zsembik, B.A., K.M. Peek, and C.W. Peek. 2000. “Race and Ethnic Variation in the Disablement Process.” *Journal of Aging and Health* 12(2): 229–249.